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NAVY JUNIOR RESERVE OFFICER TRAINING CORPS (NJROTC):
THE IMPACT OF NJROTC PARTICIPATION ON NAVAL ACCESSIONS AND
RETENTIONS

by

Phillip T. Angelini

A dissertation in partial fulfillment
of the requirements for the degree of

Doctor of Education

University of San Diego

2009

Dissertation Committee

Fred J. Galloway, Ed. D., Chair
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ABSTRACT

Officially, the Navy Junior Reserve Officer Training Corps' (NJROTC) mission is to educate high school students on the value of citizenship, public service, and personal responsibility. Since 1916, proponents and opponents have debated the value of the various Junior ROTC programs; however, there has been little empirical research that describes the extent to which these programs have actually benefited the services. As such, the purpose of this study was to examine the NJROTC program by analyzing the impact program participation has on Navy accessions and retentions from 2001 to 2005.

The methodology used in this study was an exclusively quantitative analysis of pre-existing data from two large population databases: The Navy JROTC Unit Management System, which included career intent information on 39,745 NJROTC graduates from 2001 to 2005; the other database, from the Defense Management Data Center, provided demographic data on 211,076 Navy accessions from 2001 to 2005. Analysis of these databases revealed that NJROTC graduates' intent to join the military clearly benefits the Navy as a resource for recruiting; specifically, while there were small but positive differences in Naval accessions for most NJROTC participants, there were larger positive differences for women and African-American participants. In the final part of the analysis, a binary logistic regression model was created analyzing retention among several predictor variables; results indicated that the primary predictor variable, NJROTC accessions, were 45 percent more likely to be retained than non-NJROTC accessions after holding all other predictor variables constant.

Taken together, the findings of this study have demonstrated that during the 2001-2005 period, NJROTC operated as both a citizenship training program and a source of recruiting for the Navy. As such, there are a number of recommendations for further research; the first, and perhaps most immediate would be for the Navy to conduct a cost-benefit analysis to determine geographically where it makes sense to grant full participation to the 198 schools on the waiting list; the second, and perhaps most important, would involve survey research that targets NJROTC stakeholders to find out what the response would be if the Navy openly declared NJROTC as a recruiting tool.

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DEDICATION

This dissertation is dedicated to the loves of my life: first and foremost to my wife whose love and understanding enabled me to complete this dissertation; secondly, to my three children, Nick, Alexa, and Luke who missed out on dad time while I conducted my research; and lastly to my parents, Al and Lydia, who guided me throughout my life by their unconditional love and work ethic. They will always represent to me the greatest generation.

ACKNOWLEDGEMENTS

This research started with the belief that if I was to teach leadership at the San Diego NROTC program, I should add some theory to my 24 years of practical leadership experience as a Navy officer. I am truly thankful to all the professors and graduate students at USD who mentored me in leadership theory throughout my doctoral education experience.

I am beyond grateful to my Committee. My friend and chairman, Fred Galloway, inspired me to quantify my University of San Diego leadership experience while at the same time sharing mutual interests of love of family and sports. Thank you Fred! As we go through life, one can only hope to meet and be mentored by a person of integrity. Ed DeRoche is that man. Ed, thank you my friend, for inspiring me and countless others on the importance of teaching character education to the teachers and youth of our nation. Finally, thanks to my friend Robert McNab, from the Naval Post Graduate School, who arrived at the right time to join my Committee adding his years of experience as a subject matter expert in quantitative analysis as well a unique understanding of the JROTC program.

I am grateful to Dr. J.D. Smith and Teresa Casey of the NJROTC Headquarters for providing me the NJROTC data and expert advice that was vital for my research; as well, I would like to offer thanks to Mr. John McLaughlin who guided me through the complexity of Defense Management Data Center database. I am also thankful to my good friend Don McGraw, the former Associate Provost at USD, who mentored me on university life, as well as providing sound advice for this dissertation.

I also thank the numerous military officers and enlisted personnel who throughout my career taught me by good and 'other' examples in the practical art of leadership. Thank you to all for teaching me that leadership is about knowing your stuff, taking care of people, and being a person of character. I would also like to thank some 400 ROTC students, in my three years at the San Diego NROTC Unit, who have now served their country, some in combat, as Navy and Marine Corps officers. You are to me and a grateful nation what service to our country is all about. Thank you for taking the watch over this great nation of ours.

Finally, I must acknowledge that there are too many people to list that inspired, helped, and encouraged me to complete this work. This leads me to thank Him ultimately for providing me the necessary guidance to complete this dissertation.

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CHAPTER 1

INTRODUCTION

The Junior Reserve Officers' Training Corps (JROTC), managed by the four U.S. military services—the Army, Navy, Air Force, and Marine Corps—is the largest federally-funded high school character education program in the nation. JROTC's mission is to educate high school students as to the values of citizenship, public service, personal responsibility, and to teach a sense of self-worth (Junior Reserve Officer Training Corps, 2005). While few disagree with the mission of JROTC, there is a longstanding debate concerning the appropriateness of a publicly financed, militarily administered program in high schools (Berlowitz, 2001; Walls, 2003; Trasvina, J. 2007; Barbassa, 2008; Johnson, 2008). Proponents have noted JROTC's discernible impact on personal values and educational outcomes. Opponents, on the other hand, have cited two essential arguments: (a) high schools should not be used as military training facilities, and (b) the Department of Defense (DoD) military budget should not be used to fund what is perceived to be a luxury citizenship training program (Corbett & Coumbe, 2001).

From a historical perspective, the National Defense Act of 1916 established the Army JROTC program as part of the World War I military expansion. The first JROTC program provided training for Army officers only (Hawkins, 1988). The ROTC Vitalization Act of 1964 added the Navy and Air Force JROTC programs and included funding for the expansion of the number of units from 254 to 1200 units (Reserve Officers' Training Vitalization Act of 1964).

JROTC continues to be a popular program with Congress. However, even with congressional support, JROTC is experiencing funding shortages for instructors, material, and equipment. Financial and accountability pressures make it likely that the Navy, as well as the other services, will have to justify funds allocated for their respective JROTC programs, as affirmed in the following quotation:

If history is any guide, JROTC's bright future could quickly change. Many uniformed resource managers looking at a program's fiscal bottom line rather than its long-term but unquantifiable effects on civil-military relations and moral development of the Nation's youth will undoubtedly continue to view JROTC as an expensive luxury. (Corbett & Coumbe, 2001, p. 81)

The Navy JROTC program is a cooperative effort funded in part by the military and in part by the local school district where the NJROTC Unit is located. The Naval Service Training Center (NSTC), located in Chicago, which manages the NJROTC program, claims, based on mostly anecdotal evidence, that an NJROTC Unit benefits the student as well as the community. For example, NSTC asserts that cadets gain personal satisfaction and improve their self-esteem by belonging to the NJROTC team. It should be noted that the NJROTC offers schools the opportunity to incorporate basic elements of citizenship and leadership into the curriculum. The NJROTC further states that these units support the school with community service projects as well as military ceremonial functions.

Although NSTC does not advocate NJROTC as a military recruiting program, NJROTC cadets do get special consideration for college ROTC scholarships and appointments to the U.S. Naval Academy and are entitled to advanced promotion in the military upon enlistment (Center for Strategic and International Studies [CSIS], 1999). While the NJROTC mission statement does not specifically identify accession

incentives as a form of Navy recruiting some consider these incentives as a form of Navy recruiting.

The NJROTC budget for fiscal year 2008 was \$62 million, with the hosting schools' share coupled with instructors' retirement pay, \$50 and \$100 million respectively. Thus, according to NJROTC staff in Pensacola, FL, the total anticipated cost for the over 92,685 cadets enrolled in 624 NJROTC units was \$212 million (Teresa Casey, NJROTC Headquarters Staff, personal communication, February 27, 2009).

Based on a review of the JROTC literature, the military service JROTC programs appear to produce positive social benefits, such as Cadet's feeling included in a group, when JROTC participants are compared to their non-JROTC peers. Further, the majority of the research supports the claim of JROTC's positive social benefits using survey instruments as the primary research method (Bailey, Hodak, Sheppard, & Hassen, 1992; Demoulin & Ritter, 2000; Flowers, 1999; Kilted, Solver, & Ritter, 1999; Kolstad & Ritter, 2000; Reiger & Demoulin, 2000; Roberts, 1991; Schmidt, 2001, 2003a, b; Walls, 2003). Community stakeholders in the area in which the JROTC unit resides also tend to hold positive perceptions of JROTC instructors (Logan, 2000; Marks, 2004; Perusse, 1997). Although the literature cites JROTC in a good light, there have been recent initiatives by those who oppose JROTC to pressure school boards to close down units, initiatives such as citing equal opportunity concerns for homosexuals and women, as well as removing physical education credit and eliminating air rifle competitions (Cdr. Vizcarra, personal communication, February 27, 2009; Barbassa, 2008).

Additionally, anecdotal and limited empirical evidence suggest that JROTC cadets have a greater propensity to join the military than do their non-JROTC peers (Days & Ang, 2004; Laurence & Estrada, 2003). Curiously, increased military accessions are seldom voiced as a goal by the respective service JROTC program representatives, primarily for the reason that JROTC units may not be welcomed in high schools if the program is identified as a military recruiting program (Days & Ang, 2003).

Four studies, all sponsored by the Naval Postgraduate School (NPS), Monterey, CA, provide quantifiable evidence on the JROTC program as it relates to recruiting and retaining military personnel. These studies provided an essential foundation to this research, which focuses on the Navy JROTC program. Pertinent findings from these studies are described in the “Review of the Literature” in Chapter 2. The first study noted there (Days & Ang, 2004), is an empirical examination of the impact of JROTC participation on enlistment, retention, and attrition. The researchers analyzed data from the 1980 “High School and Beyond” (HS&B) survey database and the Defense Manpower Data Center (DMDC) enlisted personnel cohort files (1980 to 2000). The second study by Laurence and Estrada (2003) also used DMDC data and provides a comprehensive review of the curriculum, budgeting issues, and recruitment. In the third NPS-sponsored study, Walls (2003) compared JROTC with other successful youth programs, such as Boys and Girls Clubs, Scouts, YMCA, YWCA, 4-H, Camp Fire, religious youth programs, sports programs, and others. Walls concluded his study with an analysis using DMDC data on military recruits who participated in JROTC. The fourth (Hentz & Packwood, 2007) investigated

whether JROTC participation significantly impacts first-term attrition, promotion, reenlistment, time to attrition, and time to promotion. This study analyzed DMDC data from 1994-2000. The results of the various studies indicated that JROTC had a statistically positive association with promotion, reenlistment and time to attrition. While each of the NPS studies provided information regarding the potential effect of JROTC participation on military enlistment and retention, these studies were focused on larger JROTC programmatic issues and incorporated only limited empirical evidence on the Navy JROTC program.

An examination of the NJROTC impact on recruiting and retention is of interest to Navy policymakers who have budget responsibility over NJROTC, recruitment, and administrative discharge costs; however, there is limited information on the impact NJROTC has on Navy recruiting. One of the reasons is that studies to date have focused on all the service programs. Secondly, emphasizing NJROTC as a recruiting tool in high schools can be problematic. Given that there are stakeholders who oppose the Navy on high school campuses for any reason, the Navy chooses to highlight the character education aspects of teaching citizenship and leadership, which, as previously reported, seems to have a positive social benefit. However, given the mandate for Navy program managers to provide measures of effectiveness of their program, quantifying the net benefits and costs of NJROTC participation will give Navy policymakers additional data to make a more informed decision with respect to the cost effectiveness of the NJROTC program.

If it can be shown with quantifiable data that NJROTC participants join and are retained in the Navy at a higher rate than non-NJROTC participants, then it may be

assumed that there is an incentive to use NJROTC as a source of recruitment.

Combining this premise with the fact that it costs an average of \$11,000 to recruit an enlisted person and less than \$5,000 to train an NJROTC cadet, one could make a cost saving argument to use NJROTC as a pipeline-training program (Laurence & Estrada, 2003).

In addition, in 2005 and 2008, two Chiefs of Naval Operations (CNO) stated in the Navy's diversity policy that they wanted to improve the representation of the Navy with respect to diversity (Admiral Michael Mullen, personal communication, September 22, 2005; Admiral Gary Roughhead, personal communication, March 3, 2008). One notable Navy diversity statistic is that fewer than 7.4 percent of the Navy officer corps is Black compared to 13 percent in the general population. Black NJROTC representation for the past 10 years has been about 34 percent. This in itself adds further substantiation to explore NJROTC as a pipeline-recruiting tool for officers representing diverse backgrounds. If empirical evidence were available that showed NJROTC positively influences their cadets to pursue a career and remain in the Navy, then program managers could use this supportive recruiting and retention evidence for the continued funding of the program. This evidence could also support other cost-saving endeavors, such as using NJROTC as a pipeline-training program to decrease time-to-train requirements or as a relatively cheaper recruiting tool.

Statement of the Problem

While current literature shows the potential positive impact of JROTC participation on values and educational performance, there is a paucity of evidence as to the benefit to the military relative to JROTC's programmatic costs. Furthermore,

there is limited information on JROTC relative recruiting and retention in all services including with little or no empirical evidence on the Navy JROTC program. The focus of this study is the Navy's JROTC program.

Purpose of the Study

The purpose of this study was to determine whether NJROTC participation has an influence on Navy accessions and retentions. If, as some argue, NJROTC participation positively influences Navy accessions and retentions, then policymakers could be made aware of the costs and benefits of NJROTC relative to other Navy recruiting programs. On the other hand, if NJROTC participation does not significantly influence Navy accessions and retentions, then the arguments of those seeking to reduce or eliminate NJROTC expenditures gain credence. By providing empirical evidence of NJROTC's effect on Navy accessions and retentions, the ongoing debate in the literature will be clarified.

Methodology

The data for the intentions of graduating NJROTC students were obtained from the Naval Service Training Command (NSTC) Navy JROTC Unit Management System (JUMS). The data for Navy enlisted personnel were obtained from the Defense Manpower Data Center (DMDC). Both data sources offer demographic data supporting the purpose of this study, which was to assess the impact NJROTC has on Navy accessions and retentions. NJROTC graduates were the study's primary subjects of consideration. The impact to the study participants was virtually non-existent given the fact the researcher cannot identify a case record with a given NJROTC cadet in the JUMS data or a given Navy accessions in the DMDC data.

The methodology for this study was a quantitative analysis of pre-existing data. Descriptive and inferential statistical analysis techniques, including logistic regression analysis, were employed to provide empirical evidence for the following research questions and hypotheses:

Research Question 1: What are the NJROTC graduates' post-high school career intentions by race, gender, location, and socioeconomic status?

Research Question 2: Are there significant differences between NJROTC participants and non-NJROTC participants for Navy enlisted accessions (DMDC data) by race, gender, Armed Forces Qualification Test (AFQT) score, location, and socioeconomic status? This research question leads to:

Hypothesis 1: Among Navy enlisted accessions, there is no significant difference between those who participated in NJROTC and non-NJROTC students.

Research Question 3: Are there significant differences between NJROTC participants and non-NJROTC participants for Navy enlisted retention by race, gender, AFQT score, location, and socioeconomic status? This research question leads to:

Hypothesis 2: Among Navy enlisted personnel who are retained in the Navy, there is no significant difference between those who participated in NJROTC and non-NJROTC students. This research question leads to:

Research Question 4: Is there a significant difference between NJROTC graduate cadets' intent to enlist in the Navy and their actual behavior by race, gender, and location? This research question leads to:

Hypothesis 3: There is no difference between the JUMS database on NJROTC cadet graduates' intent to enlist and those who actually enlist in the Navy.

Significance of the Study

The increasing significance of this study addresses the fact that since September 11, 2001, the day of the infamous terrorist attacks against the U.S., the Navy has directed all Navy program managers to justify their programs based on priorities to support the Global War on Terror (GWOT). Funding a citizenship-training program did not make the list of priorities; on the other hand, recruiting a quality force representing the diversity of America did make the list (U.S. Department of the Navy, 2004). Consequently, if it can be shown that NJROTC cadets, join and remain in the Navy at a higher rate than non-NJROTC students join and remain, then there is evidence to consider the NJROTC as a Navy pipeline-recruiting or training program. Added evidence would also be gained if it can be shown as a source for the recruitment of minorities to meet Navy diversity goals.

Definitions of Key Terms

The following are definitions of specific terms used in this study:

Accessions: These are recruits who enter the Navy as enlisted personnel or students who are selected for a Navy officer entry programs.

Armed Forces Qualification Test (AFQT): AFQT scores are a measure of recruits' qualification for potential military services. These scores are divided into five categories (I, II, IIIA, IIIB, IV, and V), with Category I being the highest. The categories are sub-divided into percentiles based on a potential recruits' scores on the test (Cat I – 93-99%; CAT II – 65-92%; CAT IIIA –

50-64%; CAT IIIB – 31-49%; CAT IV 10-30%; and CAT V – 1-9%). In FY 2004, over 70% of the Navy enlisted accessions' came from Categories I-III, which represent recruits with scores above the 50th percentile.

Attrition: Enlisted personnel who fail to complete their first term of enlistment.

For this study, recruits who leave the Navy within the first three years of their enlistment provided the metric for attrition. Those who remain in the Navy for those three years were considered retained.

Cadet: A student enrolled in any of the four service JROTC programs.

First-Term Enlistment: The first term of enlistment for the Navy is based on the time a recruit is obligated to serve to complete the enlistment contract.

This is normally 36 months.

Defense Management Data Center (DMDC): DMDC provides the military a variety of military demographic data. The data of concern for this study were demographic data on Navy accessions from 2001 to 2005.

Gender: The military is a male-dominated organization based on an 85 percent male to female ratio. There are four primary reasons for this: (1) women have a lower inclination to enlist; (2) current combat policies exclude women; (3) Growth must come from within. Lateral entries, entries from outside the military, have no significant impact; and (4) women leave the service at a higher rate than do men.

Global War on Terror (GWOT): The September 11, 2001, attacks on the World Trade Center and the Pentagon have thrust the U.S. into a new age of instability in an effort to fight terrorists around the world.

Junior Reserve Officer Training Corps (JROTC): A high school military-supported citizenship training program that is represented by the following four services: Army - AJROTC; Navy – NJROTC; Air Force – AFJROTC; and Marine Corps - MJROTC. The college program is named the ROTC program.

JROTC Unit Management System (JUMS): The JUMS database provides NJROTC leaders with up-to-date information on student enrollment demographics and financial accounting of the unit expenses. It is also used to record NJROTC career intent upon graduation from high school.

Officer Candidate School (OCS): Officer Candidate School is a 90-day training program designed to train cadets to become Navy officers.

Location: Location measures, such as the NJROTC 11 Geographic Areas and five U.S. regions, were controlled statistically to determine whether there were any significant demographic differences based on geographic location.

Race: Race is represented by the following categories: White, Black, Asian, Hispanic, and Other, and were analyzed for the JROTC Unit Management System (JUMS) data. Hispanics were not tracked consistently for the DMDC data from 2001 through 2005. Hispanics represent 13 percent of the U.S. population. However, from 2003 to 2005, the DMDC Hispanic Race data appear to be integrated with Blacks, Mexican-American, and American Indian, resulting in a small percentage reporting as Hispanics. Thus, the DMDC race categories are White, Black, Asian, and Other, with Hispanics and other low percentage race respondents reported in the Other category of

DMDC race data. The issue of under reported numbers of Hispanics has also raised questions with the 2010 Census (Washington, 2009).

Retention: Navy enlisted personnel who remain in the Navy for three years after the date of enlistment. Three years were used based on the minimum enlistment timeframe.

Return on Investment (ROI): Return on investment in the business sector is a calculation used to determine whether a proposed investment is wise and how well it will repay the investor. It is calculated as the ratio of the amount gained (taken as positive) or lost (taken as negative) relative to the base. For this study, support or contraindication for the Navy's ROI were derived from the proposed differential research with respect to Navy accessions and retentions of NJROTC graduates.

Socioeconomic Status: Socioeconomic status is based on the location of the recruit's residence upon enlistment. The four categories of socioeconomic status were derived from the 2000 Census, based on median household income and five-numbered Zip code: Low Income – 0 up to \$43,601; Medium Low Income - \$43,601 up to \$53,026; Medium High Income - \$53,026 up to \$66,082; and High Income - \$66,082 and greater (adjusted for inflation to 2008 using the U.S. Inflation Calculator at <http://www.usinflationcalculator.com/>).

CHAPTER 2

REVIEW OF LITERATURE

The purpose of this study was to determine whether NJROTC participation was an influence on Navy accessions and retentions. If, as some argue, NJROTC participation positively influences Navy accessions and retentions, then policymakers should be aware of the costs and benefits of NJROTC relative to other Navy recruiting programs. On the other hand, if NJROTC participation does not significantly influence Navy accessions and retentions, then the arguments of those seeking to reduce or eliminate NJROTC expenditures gain credence. By providing empirical evidence of NJROTC's effect on Navy accessions and retentions, the ongoing debate in the literature will be clarified by the provision of specific cost and benefit information for NJROTC.

To convey an understanding of the Navy's JROTC program, the following literature review is presented in six sections. The first section provides details on the legislative history of the Navy's JROTC program. The second section offers information on the NJROTC's organizational processes, structure, and curriculum. The third section gives specifics on the cost of the NJROTC program to the naval service and local school districts. The fourth section synthesizes the related research on the efficacy of the NJROTC program. The fifth section offers information on the Navy Recruiting Command (NRC). Although recruiting is not a stated goal of the NJROTC program, an understanding of the Navy recruiting processes is necessary to support a rationale for using NJROTC as a Navy recruit pipeline-training program. The final section summarizes the review of this literature chapter.

Legislative History of NJROTC

The literature describes three main legislative events in authorizing the funding to establish and expand the JROTC program: (a) the National Defense Act of 1916, (b) the ROTC Vitalization Act of 1964, and (c) the National Defense Act of 1993.

The National Defense Act of 1916 established the Army JROTC program because of World War I military expansion and the need to have an available source of future military officers. The first JROTC program provided training for Army officers only (Hawkins, 1988). The 1916 Act's course of instruction delineated a three-hour-per-week syllabus to be accomplished over a three-year period; upon completion, the secondary student received a certificate of eligibility for a reserve Army commission when the applicant reached the age of 21. With respect to the JROTC, the provision of the Act authorized the loan of military equipment and the assignment of active or retired Army personnel. High schools needed to maintain a minimum enrollment of 100 students over 14 years of age in the program (National Defense Act of 1916).

The second major legislative initiative, the ROTC Vitalization Act of 1964, added the Navy and Air Force JROTC programs and included funding for the expansion of the number of units from 254 to 1200 units (Reserve Officers' Training Vitalization Act of 1964). Notably, this legislation resulted from a backlash by parents, teachers, and members of Congress to then Secretary of State Robert S. McNamara's initial proposal to cut military funding for the JROTC program (Hawkins, 1988). Other significant changes to the program following this legislation consisted of the addition of the Marine JROTC program and the inclusion of female

cadets in the 1970s. Much of the research literature focuses on Army JROTC based on its 50-year advantage over the other services as a JROTC organization.

The 1992 Los Angeles riots influenced President George H. W. Bush and then Chairman of the Joint Chiefs, General Colin Powell, to increase the number of JROTC units, especially in inner city areas, in an effort to provide positive role models for disadvantaged American youth. General Powell stated, “Inner city kids, many from broken homes, found stability and role models from JROTC” (Powell, 1995, p. 541). Justification for increased funding included an expectation of increased high school completion rates, reduced drug use, raised self-esteem, and keeping the kids on the “right track” (Days & Ang, 2004). The National Defense Authorization Act of 1993 authorized funding for the expansion of the existing 1600 units to 3500 units, with the focus of placing these new units in under-represented areas, such as the northern plains, northeast and New England, and in inner cities (Laurence & Estrada, 2003).

In recent years, JROTC has continued to be a popular program with Congress. However, even with congressional support, JROTC continues to experience funding shortages for instructors, material, and equipment. Further, the No Child Left Behind Act of 2001 mandated accountability measures, such as requiring JROTC instructors to have single- and multiple-subject teaching certificates. Financial constraints and accountability pressures make it likely that JROTC programs will have to justify funding to continue the program at the present cost to the military. The following statement amplifies pressure for the military to justify their budgets:

If history is any guide, JROTC's bright future could quickly change. Many uniformed resource managers looking at a program's fiscal bottom line rather than its long-term but unquantifiable effects on civil-military relations and moral development of the Nation's youth will undoubtedly continue to view JROTC as an expensive luxury. (Corbett & Coumbe, 2001, p. 81)

The then Chief of Naval Operations, Admiral Jay Johnson, testified before Congress that "even if the number is only 30 percent [JROTC cadets joining the military], that is a good number. But think about what we get out of the other 70 percent. They have exposure to the military" (National Defense Authorization Act for Fiscal Year 2001). It can be inferred from this statement by the CNO that the general U.S. population would benefit from having an understanding of the purpose of the military.

Military recruiters have been given equal access to high school students, as is the case with other employers and college recruiters (No Child Left Behind Act of 2001). Military recruiters now have access to student phone numbers and addresses and the freedom to recruit at high school campuses. As a result, there is increased controversy over whether the military should be allowed to recruit on high school campuses. Some in JROTC leadership have voiced their concerns on JROTC recruiting in that it could open Pandora's Box, providing undeniable evidence to those who have sentiments that JROTC is being used as a recruiting instrument rather than a citizenship and leadership education program.

The NJROTC Organization and Curriculum

Under guidance provided by the Department of Defense and the Secretary of the Navy, the Naval Service Training Command (NSTC) is responsible for administering the NJROTC program. NSTC is located in Chicago; however, the

department responsible for the NJROTC program is located in Pensacola, Florida. Currently, there is a staff of 22 Area Managers and eight at headquarters, led by the director of the program, Dr. J. D. Smith. All staff members are civil service or government contractors (Dr. J.D. Smith, personal communication, January 13, 2009).

The administrative mission of the NSTC NJROTC staff is to direct and support the operations and administration of the NJROTC units through a network of 11 NJROTC area managers, which are numbered Area 3 through 13 (see Figure 1). Each area manager, usually a retired senior naval officer, and an administrative assistant are both government contractors. The NSTC NJROTC staff also provides oversight for evaluating the quality of the program and its budget (Lavin, n.d.). Area managers are geographically distributed throughout the United States. Their purpose is to provide the quality control link from the NJROTC program office in Pensacola to the present 624 NJROTC units. The area managers interface with the NJROTC Unit instructors to ensure that the Navy provides the host units proper support. Further, these 11 area managers address any issues from the host school or community in which the NJROTC Unit resides. In the summer, the area managers direct or participate in the summer training programs for instructors and summer academies for cadets. The area manager is also involved in unit assessment by ensuring each unit completes its annual graduate data report via the Navy JROTC Unit Management system. Data from 2001 to 2005 were used in this research. Each year, the area manager ensures that a qualified examiner, normally the area manager or a designated military representative, inspects all the units. Figure 1 depicts the 11 NJROTC geographical areas in which the 624 NJROTC units reside.

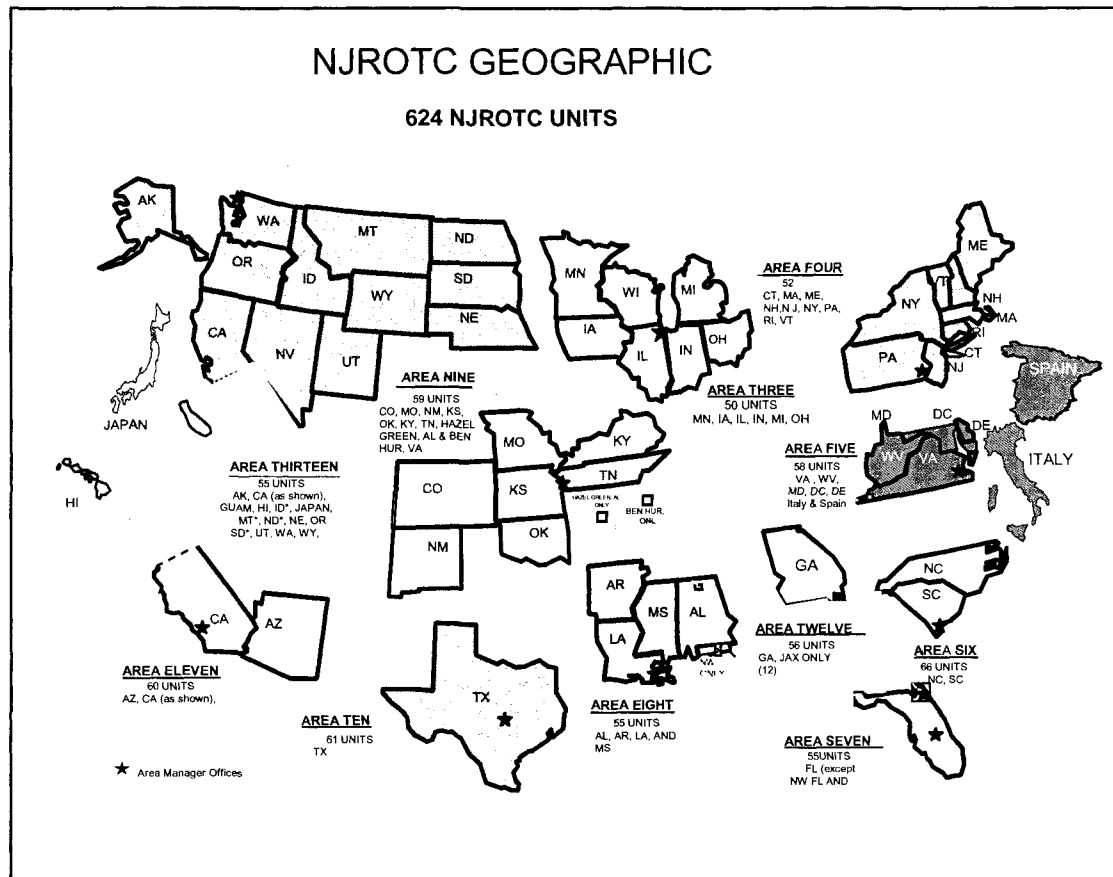


Figure 1. The 11 NJROTC Geographic Areas

From *Naval Junior Officer's Training Corps program*, by U. S. Department of the Navy, 2009, retrieved February 27, 2009, from <https://www.njrotc.navy.mil/>. As noted earlier there is no Area 1 or 2. Adapted with permission of the author.

There are over 1,300 NJROTC instructors at 624 units. These instructors, who are retired officers or enlisted personnel from the Navy, Marine Corps, and Coast Guard, teach the NJROTC program at accredited high schools. Each school participating in NJROTC has one lead instructor, called the Senior Naval Science Instructor (SNSI), a retired commissioned officers of the rank W2 (Navy or USMC Warrant Officer) through 06 (Navy Captain or USMC Colonel). Assisting the SNSI are retired enlisted personnel from the rank of E6 (Petty Officer First Class or Staff

Sergeant) through E9 (Master Chief or Master Gunnery Sergeant) who are called Naval Science Instructors (NSI). Depending on the number of cadets, there will be one or more NSIs. Though there is a separate USMC JROTC program, Marine Corps officers and enlisted personnel can fill the Navy's JROTC SNSI or NSI positions. The NSTC certifies instructors through a semi-annual board process. Instructors also have to meet certain physical fitness and weight standards. Final hiring criteria and specific qualification requirements remain with the employing school district.

Until recently, the minimum education requirement for a SNSI was a bachelor's degree and a high school diploma or its equivalent for the NSI. However, recent pressures of the No Child Left Behind Act of 2001 have forced local school districts and the Navy to address the issue of single- and multiple-subject teaching credentials for NJROTC teachers (No Child Left Behind Act of 2001). This added instructor qualification presently varies state by state but is forecasted to become a permanent requirement, causing an added burden to the hiring of the enlisted NSIs who normally do not have a bachelor's degree. For the time being, most school districts are giving SNSIs and NSIs a five-year grace period to complete their certification and educational requirements (Cdr. K. Lyles, personal communication, October 14, 2005).

The NJROTC instructor salary is roughly equal to the pay the military member received when on active duty. The host school, the naval service, and the instructor (based on his/her retirement pay) share the cost to meet the instructor's equivalent active duty pay (U.S. Department of the Navy, 2005). The minimum instructor pay is based on the following formula: Base Pay (based on rank at retirement) plus Basic

Allowance for Housing (BAH) for the area in which the unit is located, plus Basic Allowance for Subsistence (BAS), plus clothing allowance (enlisted only) plus Cost of Living Adjustments (COLA), minus Gross Retirement, which equals minimum instructor pay (MIP). MIP is divided equally between the Navy and the host school district. As an example, if a Commander/05 pay grade received \$100,000 on active duty, and his retirement pay was \$50,000, the respective JROTC service and school system would split the remaining cost of \$50,000 and incur a cost of \$25,000 each (U.S. Department of the Navy, 2005). Normally, \$25,000 per year is below the average pay for a beginning teacher, especially given that this NJROTC teacher has over 20 years of military experience. Further, some of the SNSIs and NSIs teach after-school sports programs, offering the school district an added leadership resource for teaching team sports.

To be a host NJROTC Unit school, the school must be a fully-accredited secondary education institution and must complete an application with the Naval Service Training Command (NSTC). The main provisions of the application are to (a) provide a three-year or four-year course of instruction in naval science; (b) maintain unit enrollment of 100 in the program, or 10 percent of the student population of the high school; (c) offer no less than one full credit toward graduation for each academic year of NJROTC completion; and (d) provide classroom space, storage space, instructor office space, an assembly area, a drill field, and clerical assistance (U.S. Department of the Navy, 2005). As of February 2009, there were 198 schools on the Navy JROTC waiting list.

A student must be enrolled in grades 9 through 12 at the school where the unit resides to become an NJROTC cadet. Cadets must meet the school's standards for participation in the school's physical education program. Other criteria are acceptable standards of academic achievement, standards of conduct, and personal grooming standards mandated by the SNSI and school. Essential to the grooming standards is that NJROTC cadet appearance is not to reflect disgrace on the naval service. Special NJROTC students who do not meet the qualification requirements may be enrolled as NJROTC cadets with approval of the principal and the SNSI. Any additional support to provide instruction to special education students must be provided by the host school (U.S. Department of the Navy, 1996).

As of 2004, NJROTC units numbered 624 and instructed 86,069 cadets—41 percent female and 59 percent male. The minority participation is 64 percent: 34 percent Black-American, 22 percent Hispanic, four percent Asian-American/Pacific Islander, 1 percent Native American/Alaskan Native, and three percent other. The Naval Service Training Command states that more than 60 percent of the NJROTC graduating cadets continue to higher education, with 40 percent entering military service. These minority percentages, which are higher than the nationwide average, are an indicator of the program's success in attracting cadets from diverse and disadvantaged backgrounds (U.S. Department of the Navy, 2005). Since the active duty Navy has had difficulties meeting diversification goals (Admiral Michael Mullen, Chief of Naval Operations, personal communication, September 22, 2005), NJROTC should be an attractive recruiting source based on its diverse population of cadets.

The NSTC claims, based on mostly anecdotal evidence, that an NJROTC Unit benefits the student as well as the community (U.S. Department of the Navy, 2005). Cadets gain personal satisfaction from belonging to the NJROTC team. The NJROTC offers a school the opportunity to incorporate basic elements of citizenship and leadership into the curriculum. The units support the school with community service projects, as well as ceremonial functions using color guard and drill teams. NJROTC cadets also get special consideration for college ROTC scholarships and appointments to the U.S. Naval Academy and are entitled to advanced promotion in the military upon enlistment (CSIS, 1999). These incentives appear to be recruiting incentives, although Navy JROTC leaders state that it is an unintended favorable consequence to the Navy and insist that the NJROTC program is offered to train high school students in citizenship and leadership (Cdr. Mark Watson, personal communication, June 29, 2006).

The NJROTC curriculum covers eight major academic areas over a period of four years. The course of instruction is designed to complete two areas of instruction for each year (Lavin, n.d., pp. 1-6):

1. Year One: Cadet Field Manual and Introduction to the NJROTC Course
2. Year Two: Maritime History and Nautical Sciences
3. Year Three: Naval Knowledge and Naval Skills
4. Year Four: Leadership Theory and Leadership Laboratory

The program integrates classroom time, group exercises, physical fitness, and field trips to provide a balance of different naval service learning activities. The

majority of NJROTC units also sponsor annual pass in review, drill teams, color guards, physical skill tests, and marksmanship contests.

The NJROTC goals of citizenship and leadership training are emphasized throughout the four years of cadet instruction. With respect to citizenship training, the fundamental requirements for democratic citizenship and what it means to be a good citizen are taught in Unit III - Citizenship and IV - Foundations of Our Government in the Introduction of the NJROTC Course during the second semester of the cadet's freshman year. The classroom leadership training occurs in Unit II - Leadership, occurring during the same course. Also, during the senior year, the two courses entitled Leadership Theory and Leadership Lab specifically focuses on teaching the basic principles of leadership, ethics, and morals. They also provide leadership case studies, plus a practical portion providing these senior cadets the opportunity to serve in positions of authority in their NJROTC Unit.

When comparing the NJROTC curriculum with Navy entrance training curricula for officers and enlisted personnel, there are many similarities—especially in the naval history and leadership training classes. This leads to the assumption that there has been some foresight in using the NJROTC as a Navy accessions program. It further lends credence to the idea of using NJROTC as a pipeline-training program for high school students who intend to join the Navy after they graduate from high school. This will be considered in further detail throughout this dissertation.

NJROTC Cost

In the examination of the literature, it was discovered that an accurate accounting of the total cost of the program was lacking. This is mainly because the

Navy and the host school report their budgets separately. Moreover, NJROTC cost totals generally do not include indirect costs to the host school for field trips, school space, school insurance, janitorial service, and lighting, all of which would be difficult to quantify for 624 units.

The total cost to the Navy from fiscal year 2000 to 2007 has risen from \$37 to \$58 Million supporting increases from 490 to 624 units and 69,749 to 92,685 cadets, respectively. The average cost per cadet over the same period was between \$531 (2000) and \$627 (2008) in Table 1.

Table 1

NAVY JUNIOR RESERVE OFFICERS TRAINING CORPS BUDGET

	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007
O&M Resources (000) 1/	25,913	28,183	32,283	37,394	39,798	39,743	42,875	44,595
Uniforms & Subsistence (RPA) (000)	11,089	13,945	12,207	13,937	12,388	12,763	13,094	13,476
Service Totals: (000)	\$37,002	42,128	44,490	51,331	52,186	52,506	55,969	58,071
 Avg. Cadet Enrollments	 69,749	 74,513	 77,958	 84,613	 86,069	 88,894	 90,425	 92,685
 Investment per Cadet	 531	 565	 571	 607	 606	 591	 619	 627
 Units (World-wide)	 490	 562	 582	 623	 624	 624	 624	 624

1/ O&M funding for instructor salaries (approx. 85%), textbooks, travel, educational materials, and miscellaneous expenses.

Source, FY2006 President's Budget

For FY 2008, not listed in Table 1, the Navy JROTC \$62 million budget as reported from the NJROTC headquarters staff was derived from two funding lines: Operational and Maintenance Navy (OMN) and Reserve Program Navy (RPN). The OMN budget for NJROTC, \$48 million, provided funding for instructor salaries, textbooks, travel, and educational materials. The RPN budget for NJROTC, \$14 million, provided funding for uniform items. The school districts paid an estimated

\$50 million in instructor pay (not included are benefits, FICA, and indirect costs for schools to provide working spaces on school grounds). Coupling instructor retirement pay, an estimated \$100 million, brings the total cost of NJROTC to \$212 million. (Teresa Casey, NJROTC Headquarters Staff, personal communication, 27 February 2009).

Since 2000, the NJROTC program has had a 27 percent increase in units. Although there is support for continued expansion of the Navy program, funding of the NJROTC program has not met with commensurate support from certain elements in the Navy itself. The main reason is that some believe NJROTC is a luxury item and that there are military items of greater importance to fund, especially during the present Global War on Terrorism (Corbett & Coumbe, 2001).

If empirical evidence were obtained that NJROTC positively influences NJROTC cadets to pursue a career and remain in the Navy, then program managers can give added evidence for the continued funding of the program. As stated previously, this evidence could also support other cost-saving endeavors, such as using NJROTC as a pipeline-training program to decrease time to train for Navy officers and enlisted personnel or using NJROTC as a relatively cheaper recruiting tool.

NJROTC Related Research

Most of the documentation on the NJROTC program is derived from government documents. Limited peer-reviewed literature exists focusing specifically on the Navy, which is why the majority of the related research is derived from studies on the other service JROTC programs. This section is divided into two parts. The

first part is a synthesis of peer-reviewed literature on stakeholder perceptions of the JROTC program and JROTC outcome evaluation studies. To counter the abundance of JROTC-based research supporting the program, information is included from the opponents of JROTC. The second part examines JROTC's influence on military accession, retention, and attrition.

Studies on the Perceptions and Outcomes of JROTC

The JROTC research can be categorized according to two general areas: (a) studies that assess perceptions about the program and (b) assessments on achieving the curriculum objectives. Surveys were the primary research instruments used to obtain the data. The questions were typically formed to collect factual and attitudinal data. Following an analysis of the data, the authors used descriptive and inferential statistics to report the findings.

Two examples of typical scholarly studies on perception of the JROTC program were a school counselor's perception of JROTC (Perruse, 1997) and the principal's attitude about JROTC instructors (Logan, 2000). Other stakeholder study participants were cadets, parents, and community members. These studies, and others (Hicks, 2000; Marks, 2004; Morris, 2003), reported positive stakeholder perceptions of JROTC. They also provided encouraging anecdotal claims by the participants. Of note, these researchers tended to support the JROTC program, which could create the impression of bias in the findings, especially with respect to the anecdotal claims. The largest study of NJROTC perception, *Benefits Analysis of the Naval Junior Reserve Officers Training Corps*, was conducted by the Navy in 1992 (Bailey, et al., 1992). This study, though 14 years old, was the last large NJROTC research effort

conducted by the Navy. The purpose of the study was to conduct an evaluation of the NJROTC for the Navy and the secondary school system. Survey instruments were developed targeting the perceptions of the NJROTC instructors, school administrators, members of the community, and students. A representative sample of 38 units out of the population of 228 units was selected to participate in the study, with 5,521 cadets participating, which at that time were 18.78 percent of the total NJROTC cadet population. The findings from this study reported the overall perceptions of the NJROTC program as providing positive benefits to the students and community. Following this study, the Navy began collecting annual data on NJROTC cadet postgraduate intentions, which as stated previously, are examined in this study.

Another large sample perception study of JROTC units was sponsored by the Center for Strategic and International Studies (CSIS, 1999). The intention of the CSIS study, *JROTC: Contributions to America's Communities*, was to conduct JROTC field research in medium-sized urban environments. The investigators gathered a variety of field research data from three school systems: (a) Chicago, (b) Washington, D.C., and (c) El Paso. These cities represented the type of urban environment targeted for JROTC expansion in the 1990s in order to assist disadvantaged urban youth. The findings of the study, which included NJROTC units, claimed that JROTC is beneficial to communities and should be expanded with the necessary resources (CSIS, 1999). The benefit of the CSIS report was the background information provided about the four JROTC programs. However, as in most JROTC research, the study was descriptive in nature with primarily anecdotal

evidence to support its findings. Further, the study lacked balance when compared with the reported CSIS research on the three cities. The findings of the Chicago research were far more in depth than the findings for Washington, D.C., and El Paso. In addition, this study did not identify which service JROTC units were selected for the field research. Overall, the CSIS study is problematic for those seeking quantitative evidence on the benefit of JROTC. Also, the report does not offer findings that address specific service JROTC program.

The JROTC academic outcome-related studies focused on measuring the program's effect on teaching citizenship and leadership (Bulach, 2002; Hawkins, 1988; Roberts, 1991). One such series of studies sought to compare JROTC and non-JROTC students based on two psychometric tests designed to measure citizenship. The two test measures, the DEMO and the SELF test, attempted to determine the participants' level of "democratic maturity" and "cognitive dissonance" (Demoulin & Ritter, 2000, p. 410). The DEMO test, designed to measure democratic maturity, was based on John Dewey's definition of democracy: "The interdependence of independent individuals" (Demoulin & Ritter, 2000, p. 410). The test itself was designed to measure factors that are needed to live successfully in a democracy. The SELF test measures cognitive dissonance: "Cognitive dissonance is described as a hurt caused by personal needs not being gratified" (Demoulin & Ritter, 2000, p. 410). The questionnaires that were included in the DEMO and SELF tests were administered to Army and Air Force JROTC cadets and to other organized groups—college students, high school students, and other groups (Cassel & Ritter, 1999; Cassel & Standifer, 2000a, b; Demoulin & Ritter, 2000; Kilted et al., 1999; Kolstad &

Ritter, 2000; Reiger & Demoulin, 2000; Schmidt, 2001, 2003a, & 2003b). The study made use of multiple regression analysis techniques, and it reported that “JROTC programs provide critical skills in relation to democratic maturity that are deemed essential for success in a democracy” (Demoulin & Ritter, 2000, p. 411).

Except for the 1992 Navy sponsored study and the 1999 CSIS Study, the major limitation of the JROTC perception studies and the academic outcome-related studies was sample size. Predominantly, these studies focused on just one or on small numbers of JROTC units. In addition, recent studies on NJROTC are virtually nonexistent.

With regard to dissertations or peer-reviewed articles from those who oppose JROTC on high school campuses, only two articles in the peer-reviewed literature were found: Berlowitz (2000) and Ayers (2006). Both articles provide facts and justification for the removal of JROTC from high school campuses. The main claim of both is that JROTC is a military recruiting vehicle and that high school students should not be exposed to it. Also elaborated is the fact that the military discriminates against females and homosexuals and that the military should not be allowed access to students or student information because the military is not an equal opportunity employer. Both articles lack the balance that might be expected of scholarly journals, particularly the Ayers article, which was printed in *Phi Delta Kappan*. However, as suggested previously, the studies or articles supporting the JROTC program may lack balance as well, supporting the argument that it is difficult for writers to put their agendas aside.

There are also organizations with anti-JROTC Web sites that provide opposing viewpoints about the JROTC program; most of these viewpoints are also anecdotal in nature. Morris (2003) in her dissertation on the JROTC program lists the following organizations that take an opposing view of the establishment of JROTC programs in secondary education systems:

1. American Friends Service Committee (AFSC)
2. Central Committee for Conscientious Objection (CCCO)
3. Center for Defense Information (CDI)
4. Women Against Military Madness (WAMM)
5. Veterans for Peace (VP)
6. Committee Opposed to Militarism and the Draft (COMD)
7. War Registers League
8. Gay and Lesbian Alliance Against Defamation (GLADD)
9. Project on Youth and Non-Military Opportunities (Project YANO)

The main argument against JROTC is that it is being used as a tool by the military to increase access from the pool of future enlistees. Other arguments against JROTC include the following from the Central Committee for Conscientious Objectors (CCCO, 2005):

1. The secondary education system is no place for an institution that prevents critical thinking of students in gun-free schools.
2. JROTC costs school districts tens of thousands of dollars.
3. The program violates the principle of local control.
4. JROTC provides limited oversight of the curriculum or instructors.

5. Textbooks are biased, racist, and bigoted.

6. JROTC promotes guns and warfare, which promote gangs and gang violence.

In recent years, JROTC programs have come under pressure to prohibit schools from including JROTC classes. A controversial decision in 2006 by the San Francisco Board of Education attempted to ban JROTC based on the military's discriminatory stance on gays in the military (Mattimore, 2006 & Maxwell, 2006). In November 2008, proponents of JROTC gathered enough signatures to put the measure to continue JROTC on the ballot. The non-binding measure, Proposition V, passed with 53 percent of the vote (Johnson, 2008). Additionally, California and other states are considering removing physical education credit for JROTC, which would take away a graduation requirement credit incentive for taking JROTC (Cdr. Vizcarra, personal communication, February 27, 2009).

Other opponents of JROTC, including some military program managers, have shown the sentiment that the military should not fund a citizenship education program with scarce resources. Most military program managers are continuously being asked to cut any items that do not have a direct effect on the current war on terrorism. The JROTC program currently has congressional backing, but with the continuous demands to use the military as a "911 emergency response" force throughout the world, changes in budget priorities are likely to occur (Corbett & Coumbe, 2001).

JROTC's Influence on Military Accession, Retention, and Attrition

Studying the impact NJROTC has had on military accessions and retentions is a departure from the preponderance of JROTC studies, which generally reported findings on academic or social benefits. In fact, only four studies from the Naval Postgraduate School (NPS) provide an empirical examination of JROTC participation on enlistment and retention. The Accession Policy Directorate in the Office of the Under Secretary of Defense (OUSD) for Personnel Readiness sponsored the first study, *A Comprehensive Study of the Junior Reserve Officer Training Corps Program* (Laurence & Estrada, 2003). The second study, *An Empirical Examination of the Impact of JROTC Participation on Enlistment, Retention, and Attrition*, followed up on the results of the first study and was a research project by two attending students (Days & Ang, 2004). The third NPS-sponsored study, *Naval Junior Officers' Training Corps: A Comparison with Other Successful Youth Development Programs and an Analysis of Military Recruits Who Participate in JROTC* (Walls, 2003). The fourth is *Analysis of Junior Reserve Officer Training Corps Participation and its Effects on First Term Attrition, Promotion, and Reenlistment* (Hentz & Packwood, 2007)

In the first study, the Naval Postgraduate School of Business and Public Policy was commissioned to review JROTC curricular materials, budgeting issues, and recruitment. The results of this research provided several findings of interest relating to military enlistment and retention. Based on descriptive analysis techniques using Defense Management Data Center (DMDC) data from 1990-2001, researchers at NPS determined that the Army had the greatest number of recruits who participated in

JROTC, followed by the Marine Corps, the Navy, and the Air Force. The study also confirmed that JROTC participants left the military during their first-term enlistment at a lower rate than their non-JROTC peers did. First-term attrition, defined by military personnel who fail to complete their first term of enlistment, was lowest for minority JROTC participants.

Though the NPS study by Laurence and Estrada (2003) provided unique empirical evidence that JROTC participation has a positive influence on enlistment and attrition, there exist several limitations. The researcher cautions that the number of recruits with JROTC participation is relatively small compared to the non-JROTC recruits, reflecting an imbalance in the comparison groups. The study also reported data only on enlisted personnel. In addition, the data were not sorted by the recruits' respective service JROTC program. Since the data set stops in 2001, these numbers may have changed, especially given the events that have occurred since September 11, 2001. Nonetheless, this study confirms the DMDC as a good source of data for future empirical analyses of the return on investment for the NJROTC program.

The second study, *An Empirical Examination of the Impact of JROTC Participation on Enlistment, Retention, and Attrition*, by Days and Ang (2004), used two databases: the 1980 High School and Beyond (HS&B) Survey data and DMDC data. The High School and Beyond data were collected on two cohorts of sophomores and seniors, commencing in 1980, with follow-up surveys in 1982, 1984, 1986, and 1992 (for the original sophomores only). The study contained a national stratified sample from 1,222 schools in which 36 sophomores and 36 seniors were randomly selected for a total of 14,825 sophomores and 11,955 seniors. The

information focused on high school programs, family background, goals, values, post-high school plans, and post-high school employment.

Using multiple regression analysis techniques from the HS&B cohort data, the researchers found that JROTC participation increased the probability of enlisting in the military. However, when they changed their model to account for students who may have had the inclination to join the military before participating in JROTC, there was no correlation between JROTC participation and enlistment. The method used to measure previous inclination (i.e., self-selection) was a two-stage least squares and bivariate probit equation. The latency of the data complicated the findings from the HS&B survey even further. Even if the initial analyses were accurate, it would only hold true for this 1980 cohort and may not be applicable to JROTC graduates of the 21st century. Additionally, the database had only a category of JROTC and did not have sub-categories for NJROTC.

Days and Ang (2004) also obtained Army, Navy, Air Force, and Marine Corps enlisted cohort data from the DMDC. The data obtained for this study focused on enlisted personnel who entered the service from 1980 to 2000. The extraction of these data sets was the precursor of their empirical analysis of JROTC on military enlistment, reenlistment, and attrition. The distributions included military enlistment by JROTC participants, recruits with JROTC participation by service, recruits with JROTC by gender, recruits with JROTC by race, and recruits with JROTC by Armed Forces Qualification Test (AFQT). The AFQT test is also known as the Armed Service Vocational Aptitude Battery (ASVAB) and is used by the military to assess a recruit's job qualifications.

Using regression analysis, researchers found that JROTC participation had a positive influence on reenlistments. Further, JROTC graduates tended to stay longer in the military than their non-JROTC counterparts did. Not included in the study were unemployment rates, which could have been the overriding factor for JROTC cadets to enlist and/or remain in the Navy. Finally, the DMDC data can be sorted by the respective service JROTC program, which is the focus of this research. The NJROTC information is tracked under the category of “Youth Program.”

The third NPS-sponsored study by Walls (2003), *Naval Junior Officers' Training Corps: A Comparison With Other Successful Youth Development Programs and an Analysis of Military Recruits Who Participate in JROTC*, compared JROTC with other successful youth programs, such as Boys and Girls Clubs, Scouts, YMCA, YWCA, 4-H, Camp Fire, religious youth programs, sports programs, and others. Walls also analyzed pre-existing DMDC data from 1990 to 2001 to compare military enlisted accessions between those who participated in youth programs and those who did not. The main finding of this study was that JROTC is similar to other youth programs in having a positive effect on youth development. The study also claimed that no other single high school youth program could match JROTC in its size, level of funding, and scope of accomplishments (Walls, 2003).

The final NPS study (Hentz & Packwood, 2007) investigated whether JROTC participation significantly impacts first term attrition, promotion, reenlistment, time to attrition, and time to promotion using DMDC data from 1994-2000. The results indicated that JROTC had a statistically positive association with promotion, reenlistment and time to attrition. The present study added to the Hentz and

Packwood research by using DMDC data from 2001 to 2006; moreover, this current research study was specifically focused on the Navy JROTC program rather than all the service programs.

Similar to the research of this present study, these four studies, cited in this section, used pre-existing DMDC data, though the data were limited to 2001 or prior. The latency of the data, plus the fact that these studies do not provide detailed information on the NJROTC program, adds greater relevancy to research on the Navy JROTC program.

The Navy Recruiting Command (NRC)

The rationale to consider using NJROTC as a recruitment tool for the Navy is timely, especially considering the growing evidence that the other services, primarily the Army and Marine Corps, are increasing their recruiting efforts at high schools with JROTC units (Department of the Army, 1999; Dr. William McHenry, personal communication, June 20, 2005). The Navy Recruiting Command (NRC), located in Millington, Tennessee, is responsible for recruiting men and women into the active duty and Naval Reserve enlisted force. The NRC also recruits officers for Officer Candidate School and processes applications for Naval Reserve Officer Training Corps (NROTC). Officer applications for the Naval Academy are not processed by the NRC; these are done by the Naval Academy itself. The NRC manages over 1600 recruiting installations with almost 8,000 personnel and budgets of nearly \$1.2 billion annually. The recruiting advertising budget for 2006 was over \$100 million (Cdr. Glen Kaemmerer, personal communication, November 7, 2005). The Navy has met

its recruiting goals for the past 25 years. For the past 10 years, it has recruited an average of 50,000 enlisted personnel and 3000 officers per year.

Although the Navy has achieved its recruiting goals for some time, it has not always received the highest quality of recruit or met its diversification goals. The Navy Recruiting Command measures qualification for potential military jobs of the recruit by using the AFQT test. Since 2003, the Navy has raised the bar slightly by increasing the percentage of Test Score Category I-III A recruits (those scoring above 50 on the AFQT of the ASVAB) from 65 percent in FY03 to 67 percent in FY04. In addition, JROTC cadets receiving advance pay grade status in the Navy have increased (2003 = 380, 2004 = 404, 2005 = 645). Between 2003 and 2005, the Navy also improved the number of recruits with high school diplomas slightly and raised the percentage of new recruits with college experience (12 or more college semester units). Not to detract from these positive performance metrics, but these results may have a connection to the Navy's recent attraction as a military service—especially since the Army and Marine Corps are doing the preponderance of the heavy fighting in Iraq and Afghanistan.

Proving that NJROTC participation can provide savings for the recruiting budget or provide access to improve the quality and diversification of Navy accessions is of considerable interest to the Navy. The Chief of Naval Operations recently stated he is looking for new ways to recruit minorities, especially Black Americans. Currently, the percentage of Blacks in the Navy officer corps is seven percent, which is well below the national population average and that of DOD. In an email to the Navy senior leadership, the then Chief of Naval Operations stated:

I am interested in truly thinking about diversity in new ways and breaking some china. I want to achieve measurable, permanent effects, so that—even through somebody's benign neglect in the future—what we do cannot be undone...The diversity of our Navy matters—a very great deal. I know you share my desire to make a difference and thank you in advance for your continued support. (Chief of Naval Operations, Admiral Michael Mullen, personal communication, September 22, 2005)

Summary

Given the forecast of austere military budgets to fund the Global War on Terror, the findings of this research should be of considerable interest to Navy JROTC officials and recruiters as they justify their programs' budgets. The reviewed literature on the JROTC program revealed positive information concerning the influence that JROTC has had on the nation's youth for the past 80 years. The legislative history pointed to three pieces of legislation supporting the expansion of the program; specific to the Navy JROTC program was the ROTC Vitalization Act of 1964, which added the Navy and Air Force JROTC programs. Pertinent background facts were provided in this literature review on the organization, curriculum, and cost, followed by a synthesis of the related research. Notably, only four studies in the literature, all from the Naval Post-Graduate School, offer insight on JROTC participation as an explanatory variable supporting the program's direct return on investment to the military. The findings from these studies offer some empirical evidence on JROTC participation having a positive influence on military enlisted accessions and retention. Additionally, these studies confirmed that there has not been a comprehensive study on Navy's JROTC's influence on military accessions, retentions, and attrition. Last, background information on the Navy Recruiting

Command was offered to support or refute those that believe NJROTC should be considered as a pipeline-training program.

CHAPTER 3

METHODOLOGY

The scope of this dissertation was limited to empirical analysis of the Navy's JROTC program with a primary focus on the impact NJROTC participation has on Navy accessions and retentions. This study has increasing significance because since September 11, 2001, the Navy has directed all Navy program managers to justify their programs based on priorities to support the war on terrorism. Funding a citizenship-training program, which the NJROTC program emphasizes in its mission statement, did not make the official list of Navy priorities (U.S. Department of the Navy, 2004). On the other hand, recruiting a quality force representing the diversity of America did make the list. Thus, having insight into the intentions of NJROTC graduates and comparing demographics between NJROTC and non-NJROTC Navy accessions is of interest with respect to Navy recruiting. Also of significance is determining whether NJROTC accessions stay in the Navy at a higher rate than do non-NJROTC accessions. The study also provides NJROTC program managers a unique insight into the NJROTC descriptive and inferential data, which may provide increased awareness on the efficacy of the NJROTC program. There are currently 700 secondary schools on the waiting list for JROTC, with Navy having 198 on the waiting list (Barbassa, 2008; Teresa Casey, NJROTC Headquarters Staff, personal communication, February 27, 2009). Given this, the research reported in this dissertation may also be of benefit to Navy decision-makers in deciding which NJROTC area or region to add or remove units.

In this chapter, there are five main sections: one, which describes the data and how it was collected; two, which describes the data analysis plan based on the research questions and hypotheses; three and four, which address selection bias and limitations of the proposed research; and finally, a summary of this methodology section.

Data Collection

There is no single tracking system of what happens to NJROTC cadets after high school graduation. The Department of Defense is on record for not tracking how many cadets enlist in the military (Barbassa, 2007). The reason is based on Privacy Act concerns to protect high school students. The Navy does do an exit survey for their NJROTC graduates but does not track whether these cadets actually join the Navy. The two databases consulted for this study, as noted above, were the Navy's JROTC Unit Management System (JUMS) database, from which the career intent of NJROTC graduates are maintained, and the Defense Manpower Data Center (DMDC), which provides data on all Navy enlisted accessions including NJROTC participants. Both the JUMS and DMDC databases used in this study contained the population data of NJROTC graduates and Navy accessions from 2001 to 2005.

The JUMS database includes variables that record NJROTC graduate career intent data (Appendix A). NJROTC program managers in Pensacola, Florida, maintain the database, and permission to use it is required. Each NJROTC Unit at a school collects career intent data annually on graduating seniors and records it into the JUMS database, which also provides the Navy Training Service Command

(NTSC) with up-to-date information on student enrollment demographics and financial accounting of the unit expenses.

The JUMS data have been recorded since 1994. The five years obtained for this study ranged from calendar year 2001 to 2005. The relevant JUMS data for this study are included in Table 2, which shows the career intentions of graduating NJROTC cadets.

Table 2

NJROTC Graduate Career Intent 2001 – 2005

		2001	2002	2003	2004	2005
NJROTC GRADUATES		7571	7385	7963	8157	8669
	4 YR COLLEGE	2174	2393	2710	2919	3164
	JUNIOR COLLEGE	1228	1173	1257	1382	1345
	TRADE & VOCATIONAL	342	312	301	354	409
TOTAL COLLEGE		3744	3878	4268	4655	4918
MILITARY ACTIVE & RESERVE						
	NAVY	1089	1066	1145	1146	1235
	ARMY	871	761	694	878	1040
	AIR FORCE	427	385	326	102	116
	MARINE CORPS	636	577	626	606	663
	CG/MM	34	33	39	47	46
TOTAL MILITARY		3057	2822	2830	2779	3100
EMPLOYMENT ONLY		461	495	612	621	592
UNDECIDED & OTHER		496	419	427	381	365

Note. Distribution of NJROTC Graduates Intentions, 2001-2005.

From JROTC Unit Management System Database, by U.S. Department of the Navy, 2006.

Approximately two percent of NJROTC graduates pursue both reserve/guard and post secondary education pursuits.

Table 3 provides a description of the variables after the initial coding of the variables. These variables were the primary demographic variables that were analyzed on the NJROTC graduating cadets.

Table 3

Navy JUMS Variable Description

Variables	Definition
School Year	2001 through 2005
Unit Identification Code	5 numeric digit code given to each NJROTC unit
Race	0 = White, 1 = Black, 2 = Hispanic, 3 = Asian, 4 = other
Gender	0 = Male, 1 = Female
Education	0 = 4 Year College, 1 = 2 Year College, 3 = Junior College, 4 = Technical or Vocational School
Military Program	0 = Academy, 1 = ROTC Scholarship, 2 = ROTC Non Scholarship, 3 = Boost, 4 = Enlisted
Military Service Branch	0 = Navy, 1 = Army, 2 = Air Force, 3 = Marine Corps, 4 = Coast Guard/Merchant Marines
Other	0 = Employment Only, 1 = Undecided, 2 = Other
NJROTC Geographic Area	Area 3 through 13 defined by its respective number
Zip Code	5 Digit Zip Code based on location of NJROTC unit

Note. Distribution of NJROTC Graduates Intentions, 2001- 2005.

From JROTC Unit Management System Database, by U.S. Department of the Navy, 2006.

The Navy enlisted accessions data are derived from pre-existing data collected from DMDC (Monterey, California), and it is used with their permission. The DMDC enlisted data are divided into cohort files of those who entered the Navy in a given fiscal year. Scrambling the social security numbers of the cases assured subject anonymity. The five cohorts obtained for this study ranged from fiscal year (FY) 2001 to 2005 and are shown in Table 4. A fiscal year for the military runs from October through September.

Table 4

Number and percentage of NJROTC and non NJROTC Navy Accessions for 2001 to 2005

	2001	2002	2003	2004	2004
NJROTC	365	350	306	298	455
	1%	1%	1%	0.77%	1%
Non NJROTC	50156	43826	39297	38333	37690
	99%	99%	99%	99%	99%
Total	50521	44176	39603	38631	38145

Note. Distribution of naval accessions by race for 2001- 2005. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

The primary variable of interest for this research is NJROTC graduates who were identified in the cohort files under a variable entitled “Youth Program.” Additional military “Youth Program” variables in this category were the other service JROTC programs, Cadet Air Patrol, Sea Cadets, and the Reserve Officer Training Corps, none of which were considered in this research. A complete list of the variables selected for this research from the DMDC can be found in Table 5. This table provides a description of the variable categories.

Table 5

DMDC variable description

Variable	Definition
RETAIN (Limited to Navy accession for FY 2001 – 2003)	0 if the Navy accession was separated within three years of enlistment , 1 if accession completed at least the first three years of enlistment
NJROTC (variable transformed from the Youth Program Code variable)	0 if the Navy accession was a Non NJROTC accession, 1 for NJROTC accession who participated in JROTC for three or four years of high school
Gender	0 if the Navy accession was a Male, 1 if the accession was a Female
Youth Program Code	"Youth Program" variables in this category were the JROTC programs, Cadet Air Patrol, Sea Cadets, and the Reserve Officer Training Corps.
RACE	0 if the Navy accession's race was White, 1 if race was Black, 2 if the race was Asian, 3 if the race was Other
Socioeconomic Status (variable based on Median Income transformed from 2000 Census data merged with Zip code)	0 if the Navy accession's Medium Income group was from the Hi Income Group, 1 if from Lo Income group, 2 if from Medium Lo income group, 3 if from Medium Hi income group
REGION (variable based on zip code of NJROTC unit)	"W" if the Navy accession's region was from West, "SW" if from the Southwest, "MW" if from the Midwest, "SE" if from Southeast, "NE" if from the Northeast, "O" if from other.
Mental Group based on AFQT Score	"1" if the Navy accession's AFQT category was 1, "2" if AFQT category was 2, "3A" if AFQT category was 3A, "3B" if AFQT category was 3B, 4 if AFQT category was 4, 5 if AFQT category was 5, "UNK" if AFQT category was unknown.
Accession Year	Defined based on accession year from 2001 to 2005
Separation Code	Defined by numerous Separation codes.
Zip Code	5 Digit Zip Code based on home of record of Navy accession.

Note. Distribution of naval accessions by race for 2001- 2005. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

The first step in preparing the demographic information (the data cleaning process) was to transfer the data into Statistical Processes for the Social Sciences (SPSS) so that the exploration process could begin. The difficulty of cleaning and organizing five years of data, 2001 to 2005, contained in 10 large data sets was greater than was initially expected. The JUMS data had over 8000 records with 12 variables and DMDC had approximately 50,000 records with 11 variables. Missing data were to be expected in large data sets; however, for both the DMDC and JUMS

data bases, missing data was not a real problem in that missing data for most variables received were labeled as unknown, or in the case of one variable, socioeconomic status, the missing data was removed. The socioeconomic status variable was created during the research when Zip code data were transformed into the socioeconomic status variable using median income data from the 2000 Census. Eliminating 2,239 thousand records out of 134,300 for socioeconomic status provided the research with 98.3 percent sample of the population data for socioeconomic status. The missing socioeconomic status data were removed during the logistic regression modeling. To account for the impact of the missing socioeconomic status data on the other predictor variables, a means test was conducted between the population and sample data, resulting in no significant difference between the considered variables for the population and sample databases. The means test conducted is further elaborated in the Results chapter with a detailed analysis offered in Appendix C. Notwithstanding, several other challenges presented themselves transforming variables into information suitable to provide insight into the research questions.

DMDC data information on Hispanics beyond 2002 was not consistent with the 2000 and 2001 DMDC datasets. For 2003-2005, the DMDC data set had problems that made it virtually impossible to classify an independent response for the Hispanic category. Thus, the Hispanics category for the Race variable is not used; instead, the following race categories were used: White, Black, Asian, and Other.

To answer the research questions, the following variables had to be transformed using SPSS:

- JUMS intent to join active service branch and reserve branch were merged to create a single integrated service branch variable to highlight which service benefited most, active or reserve, from NJROTC graduates.
- JUMS intent to pursue education only and education with employment were merged to create a single integrated education variable to emphasize the amount of NJROTC cadets pursuing post-secondary education goals.
- For JUMS data, Zip code corresponding to NJROTC Unit Identification Code (UIC) was added as a variable, which was necessary to provide socioeconomic status on the NJROTC cadets.
- Using 2000 Census income data, the Zip code data for NJROTC graduating cadets and Navy accessions were transformed into a socioeconomic status variable for both DMDC and JUMs data.
- DMDC Youth Program Code – This variable contains several youth program categories. A new variable was created to isolate NJROTC and non-NJROTC accessions allowing various demographic data to be compared.
- DMDC separation program designation (SPD) codes were regrouped to isolate categories of adverse attrition, non-adverse, unknown, and non-separated for the accessions first three years of their enlistment. Additionally, to create a dichotomous variable for the binary logistic regression model, a variable of separated and not separated was created.
- To compare the NJROTC and non-NJROTC accessions by location, a new variable was created from Zip code data based on U.S. region. The five U.S. Regions were West, Southwest, Midwest, Southeast, and Northeast.

Research Questions/Hypotheses Data Analysis Plan

There are four research questions and three hypotheses to guide this dissertation.

Research Question 1: What are the NJROTC graduates' post high school career intentions by race, gender, location, and socioeconomic status?

The data were summarized using the following pertinent demographic variables: location of NJROTC Unit, gender, race, and career intent following graduation. The variables for career intent were enlisted, officer training programs, branch of service, employment, college, trade/vocational, and other. New variables for socioeconomic status and region were created using the NJROTC Unit location. All data were nominal. Cross-tabulation procedures using the computer program Statistical Program for the Social Sciences (SPSS) were used to describe the NJROTC post graduation intentions for the demographic factors cited in the research question.

Research Question 2: Are there significant differences between NJROTC participants and non-NJROTC participants for Navy enlisted accessions (DMDC data) by race, gender, AFQT score, location, and socioeconomic status?

Data were summarized using the following pertinent demographic variables: date and location of Navy enlistment, Navy JROTC, gender, race, and mental aptitude defined by their Armed Forces Qualification Test (AFQT) score. The location of Navy enlistment was based on the recruits' five-numbered Zip code and provided information on the recruits' socioeconomic status when matched with Zip code 2000 Census Data. The Zip code data were also used to create the U.S. region variable. All

data were nominal except the AFQT score, which is ordinal. Cross-tabulation procedures using SPSS were used to compare the differences of the groups cited in the research question.

The hypothesis this research question attempted to support or refute was:

Hypothesis 1: Among Navy enlisted accessions, there is no significant difference between those who participated in NJROTC and non-NJROTC students.

Research Question 3: Are there significant differences between NJROTC participants and non-NJROTC participants for Navy enlisted by race, gender, AFQT score, location, and socioeconomic status?

Descriptive and inferential statistics were used in an attempt to answer this question. The variable of importance in determining whether there is any discernible benefit for the Navy based on retention was the subject's accession and separation date. The retention variable was based on the military definition of first-term enlistment, which for the vast majority of Navy recruits lasts three years. The three years assessed were Navy accessions from 2001 – 2003. The reason that later years were not assessed was that the study needed to follow Navy accessions for a three year period. Since, the data from DMDC were received in 2007, which tracked Navy accessions up until 2006, the 2003 cohort was the last group of Navy accessions used for research question three. The two main groups for the research were Navy accessions who participated in NJROTC and the non-NJROTC Navy accessions. Also assessed, using logistic regression, were the interaction effects of race, gender, AFQT score, location, and socioeconomic status variables.

Using coded DMDC data, a regression model was created to determine whether any inferences could be drawn on the impact NJROTC participation has on enlisted retention. The dependent variable for this model was based on the binary response for those who continue to remain in the military after the time period specified as first enlistment and those who leave the military during this same timeframe. Since this dependent variable was a binary response, logistic regression techniques were suitable to determine whether there were significant differences among the primary independent variable, NJROTC participation, as well as possible interaction effects of other variables such as race, gender, location of enlistment (U.S. Region), socioeconomic status (based on Zip Code and Census data), and AFQT score

Many social science researchers conduct studies that have dependent variables of dichotomous nature. In fact, the use of logistic regression has expanded so much that it could soon take over from multiple regression as the research tool of choice. Logistic regression is different from ordinary least squares (OLS) regression in that homogeneity of variance (does not assume homoscedasticity) and normality of errors are not assumed. In fact, there are three main assumptions required for logistic regression (Meyers, 222, 2006):

- There must be an absence of perfect multicollinearity.
- There must be no specification errors (i.e., all relevant predictors are included and irrelevant predictors are excluded).
- The independent variables must be measured at the summative response scale, interval, or ratio level (although dichotomous variables are also allowed).

The variables and their respective coding for the initial *a priori* model were previously shown in Table 4. The coding of the variables is essential for properly understanding the results of SPSS model runs. In fact, SPSS will automatically recode the variables if they are not coded properly, which can result in significant confusion for researchers. In SPSS, for both the dependent and independent variable, the comparison group should be coded one for a dichotomous variable or one or greater for categorical variables while the referent or control group (sometimes referred to as the omitted variable) should be coded with zero. Another approach is to create a dummy dichotomous variable for each category of the categorical variables. Either method, with properly coded variables, will yield the same results.

There are two reasons why ordinary least squares are not appropriate when the dependent variable is dichotomous (Meyers, 2006). (1) The equal variance assumption is violated (the assumption of homoscedasticity) and (2) that using least squares can produce values greater than one or less than zero. This evidenced in Figure 2 where the shape of the best fit line for logistic regression is an S-shaped line versus the straight line of a linear function (Meyers, 2006).

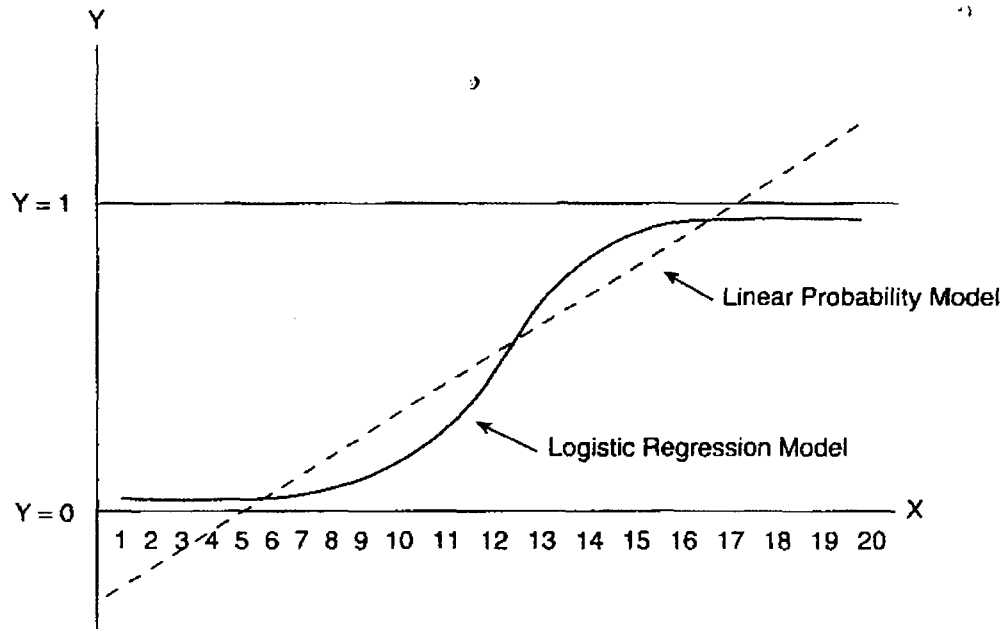


Figure 2: Comparing the Linear Probability and Logistic Regression Models (Meyers, p. 225, 2006)

In conducting the analysis, it is important to know that data are transformed using the natural log (ln), which is what bends the data to fit the S shaped curve. The main goal of logistic regression is to predict a case's membership in the comparison group signified by the likelihood or probability of an event occurring based on a given value for the predictor variable. As cited from Meyers (2006), there are two mathematical steps used in a formal explanation of the model: Step 1, forming the logistic regression equation (1) transforms the probability of an event occurring to the natural log (ln) of the odds that a case belongs to the response group.

$$\ln [\text{odds}] = a + b_1X_1 + b_2X_2 + \dots + b_nX_n \quad (1)$$

Substituted into the left side of the equation is the natural log, which in OLS is the predicted dependent variable. "The b coefficients indicate the change in log odds of

membership for any 1-unit change in the independent variables” (Meyers, p, 227, 2006). Hence, logistic regression is just OLS using the logit as the outcome variable. To provide clarity, Meyers (2006) translates the outcome variable by symbolizing predicted group membership as g_{pred} (1a):

$$g_{pred} = \ln [\text{odds}] = a + b_1 X_1 \quad (1a)$$

To see how this works consider the following example: Meyers (2006) lets the outcome variable be seeking psychiatric therapy or not and then lets X_1 be a dichotomous variable for gender - coded with one for males and zero for females. Following a logistic regression run, the results yielded -1.099 for the constant “a” and 1.792 for the coefficient. “b”. This linear formula results in the probability of females seeking therapy is .693 (1b) and males seeking therapy is .250 (1c).

$$g_{pred} = -1.099 + 1.792(1) = 0.693 \quad (1b)$$

$$g_{pred} = -1.099 + 1.792(0) = 0.250 \quad (1c)$$

Step 2, Computing the logit outcome: This is accomplished by inserting g_{pred} into equation (2), known as the antilog function ($e = 2.7182$), to transform the log odds into probabilities resulting in a .667 probability that females will seek therapy (2a) and a .250 probability that males will seek therapy (2b):

$$e^{g_{pred}} / (1 + e^{g_{pred}}) = \text{predicted probability} \quad (2)$$

$$2.718^{.693} / (1 + 2.718^{.693}) = .667 \quad (2a)$$

$$2.718^{-1.099} / (1 + 2.718^{-1.099}) = .250 \quad (2b)$$

Calculating the odds ratio between the comparison group and the reference group is one of the primary objectives in logistic regression. However, odds are different from probability, in that odds are not bounded by zero and one. Odds can go

from zero to infinity. If there is an equal chance of an event occurring then the odds are one to one. Odds that are equal to one are the same as failing to reject the null hypothesis in logistic regression. Odds that are less than one indicate that there is a less of a chance of an event occurring. Moreover, an odds of 1.25 is the same as saying that there is a 25 percent increase in the chance of an event occurring. The odds ratio is calculated using “ e ” (the exponential function) and the “ b ” coefficient for the comparison group. To find the odds ratio of the comparison group to the reference group, one raises e to the b power (3). Since $b = 1.792$ the odds ratio indicates that females are six times more likely than males to seek psychiatric therapy (3a).

$$e^b = \text{odds ratio} \quad (3)$$

$$2.718^{1.792} = 6.0 \quad (3a)$$

The SPSS binary logistic regression application computes the odds ratio for the predictor variables as well as other results. Essential to this research is interpreting the results of the model runs (Meyers, 2006).

- The first step is to evaluate the “ a ” and “ b ” coefficients and their standard errors. Coefficients in logistic regression are determined by a maximum likelihood estimation (MLE). The objective of this technique is to maximize the log likelihood of the odds that the observed values of the dependent variable may be predicted from the observed values of the predictors. MLE is an iterative algorithm that starts with an initial “guestimate” and then determines the direction and magnitude of the “ a ” and “ b ” coefficients. In contrast, OLS Regression determines the

coefficients by minimizing the sum of squared distances to the regression line. Analogous to OLS, “ b ” coefficients close to zero indicate that there is no effect caused by the independent variable.

- The p value test result determines whether the independent variable is significantly associated with the dependent variable. It is from the “ p ” value a researcher normally assesses as to whether the variable should be included in the model or not.
- Next, the odds ratios for the predictor variable and their respective confidence intervals are assessed. These results were of primary importance in determining the odds ratio, as discussed previously, of NJROTC participation along with interaction effects of the other predictor variables on Navy retention.
- Finally, there are a number of tests to assess the validity of the model. The significance of these tests (Likelihood Ratio Test, Omnibus Test of Model Coefficients, Model Summary, Pseudo R^2 , Hosmer and Lemeshow Test and Wald Test) is discussed in Chapter IV when the results of the binary logistic regression model are discussed.

The hypothesis this research question attempted to support or refute was:

Hypothesis 2: Among Navy enlisted who are retained in the Navy, there is no significant difference between those who participated in NJROTC and non-NJROTC students.

Research Question 4: Is there a significant difference between NJROTC graduate cadets' intent to enlist in the Navy and their actual behavior by race, gender, and location?

Differential research was conducted on the NJROTC graduate intention to enlist in the Navy (JUMS data) compared to the actual Navy enlistment data (DMDC data). Cross-tabulation procedures using SPSS were used to compare the differences of the two databases cited in the research question. However, a major problem linking these two databases was that due to Privacy Act reasons for high school students social security numbers were not provided in the JUMS data. As explicated in the results chapter, there were also other problems in drawing direct comparison between the JUMS and the DMDC databases.

The hypothesis this research question attempted to support or refute was:

Hypothesis 3: There is no difference between the JUMS database on NJROTC cadet graduates' intent to enlist and those that actually enlist in the Navy.

Selection Bias

While selection bias is usually a concern when examining the decisions of individuals to engage in a particular course of action, one can argue that selection bias was not present in this study based on the following reasons. First, with respect to participation in NJROTC, the JUMS data provides the population of individuals enrolled in NJROTC for the period of analysis. The focus of this analysis was whether there were distinctive characteristics of the NJROTC population relative to the population of the US Navy, that is, attributes of two distinct populations to which individuals select themselves were compared. Since the entire population was

observed, the typical sampling problems of the properties of the non-observed observations were not of concern.

Second, with respect to the testable hypotheses whether NJROTC participation has a discernable impact on first term service outcomes, the population of individuals who ascend to military service and who complete (and fail to complete) their first term of service were observed. The focus of this analysis was to examine the behavior of the population of individuals who choose to ascend to service. The impact of NJROTC graduates who chose not to ascend was not a concern of this study. While the differential analysis of NJROTC on individual outcomes of those who choose a different, non-military course of action is interesting, it was beyond the scope of this study and was thus not germane to the issue of selection bias.

Limitations and Delimitations

As stated previously, the scope of this dissertation was to determine the impact the Navy's JROTC program has on Navy accessions and retentions. The following are limitations and delimitations:

Limitations

The following issues placed limitations on the research:

- Because of privacy issues discussed above, social security numbers of NJROTC cadets cannot be accessed. If cadet SSN were available, the impact NJROTC participation has on a variety of demographic variables with respect to Navy accessions and retentions could be easily assessed.
- A limitation in the measurement of socioeconomic status is that the recruit may have moved from his or her family home and that the recruit's reported Zip

code might be from a different income level. It is assumed that this relocation error increases as a recruit delays enlistment following his or her 18th birthday. Further, since the median income correlation was based on the 2000 census, new Zip codes for 2001, 2002, and 2003 were reported as having no median income. These missing cases, which corresponded to less than 1.7 percent of the data, were removed from the database for any analysis on socioeconomic status. The four median income groups were divided into four categories: Low (0 up to \$43,601), Medium Low (\$43,601 up to \$53,026), Medium High (\$53,026 up to \$66,082), and High (\$66,082).

- Another limitation of the present study was that the data from the DMDC do not report JROTC or NJROTC participation of fewer than two years. It is not reported because Navy enlisted personnel only get grade advancement credit if they have completed three or more years of JROTC. Thus, the enlisted data were limited to NJROTC cadets with three or more years as cadets.
- There may be bias associated with the self-reported data on graduate intent of the JUMS database. This has ramifications for both Research Questions 1 and 4.

Delimitations

Delimitations are self-imposed limitations in the research. These are:

- The analysis of the data focused on NJROTC pre-existing data from 2001-2005 for both the JUMS and DMDC data.
- The DMDC data are limited to enlisted personnel only, since the obtained DMDC data provided information on enlisted personnel only.

- There are three main Navy officer entry programs: Naval Academy, Naval Reserve Officer Training Corps (NROTC), and Officer Candidate School (OCS). Only the U.S. Naval Academy and NROTC track NJROTC participation. NROTC program managers denied access to their OPMIS database, based on Privacy Act concerns. Given this obstacle, access to the other Navy officer program data was not pursued.
- Research Questions 3 had only three FY cohorts (2001, 2002, 2003), based on the fact that the final accessible DMDC data was FY06. This delimitation assumes that the metric for retention is whether a recruit completed the first three years of his or her enlistment.

Summary

The purpose of the research was to determine whether NJROTC participation has an influence on Navy accessions and retentions. The study's primary focus is on NJROTC and non-NJROTC participants who enlist in the Navy. It also provides demographic information on the career intentions of NJROTC graduates. The research methodology is quantitative, combining descriptive and inferential statistic techniques to answer the four research questions and three hypotheses.

The implications of this study go beyond the previous JROTC research using survey methods studying perceptions and learning outcomes. The specific focus of this research was to analyze pre-existing data to gather descriptive and inferential evidence on the influence NJROTC participation has on Navy accessions and retentions. Empirical evidence is provided in Chapter IV and V on the efficacy of the NJROTC program. Research also provides Navy JROTC program managers

empirical evidence on the salient effect of the directed budget priorities for the Global War on Terror. Lastly, quantitative evidence is shown in the findings that NJROTC cadets intend to join and are actually retained in the Navy at a higher rate than non-NJROTC accessions, which adds credence for the Navy to consider the NJROTC as a Navy pipeline-recruiting or training program.

CHAPTER 4

RESULTS

The purpose of this study was to determine whether NJROTC participation has an influence on Navy accessions and retentions. The raw data came from two sources, the NJROTC organization, Navy JROTC Unit Management System (JUMS) data, and Defense Management Data Center (DMDC). Chapter 3 described the methodology for answering the research questions. The data analysis and results for this dissertation was organized based on the four research questions.

Data Analysis and Results Organized by Research Questions

Research Question 1

What are the NJROTC graduates' post high school career intentions by race, gender, location and socioeconomic status?

The host schools are asked annually to provide the Naval Education Training Command (NETC) a variety of information on their graduating seniors. Figures and tabular data are offered in this section to provide noteworthy findings on NJROTC graduate intentions. The data for research question one was derived from the Navy JROTC Unit Management System database from the Department of the Navy (2006) and the 2000 United States census.

Figure 3 provides the number and percentage of education career intentions for NJROTC graduating cadets for the years 2001 through 2005. As seen in Figure 3, half of the NJROTC graduates plan to continue education after high school. The education options were four-year college, junior college, or technical or vocational school. The Total Other category consists of NJROTC graduates who were undecided, reported employment only, or did not provide a response. Of note, there was a seven percent rise in Total Education, 50 to 57 percent, from 2001 to 2005. Also evident was the decreasing trend of NJROTC graduates' intent on joining the military, decreasing from 40 to 36 percent from 2001 to 2005. Taken together with the global war on terrorism, NJROTC cadets may have found the education option more appealing than joining the military.

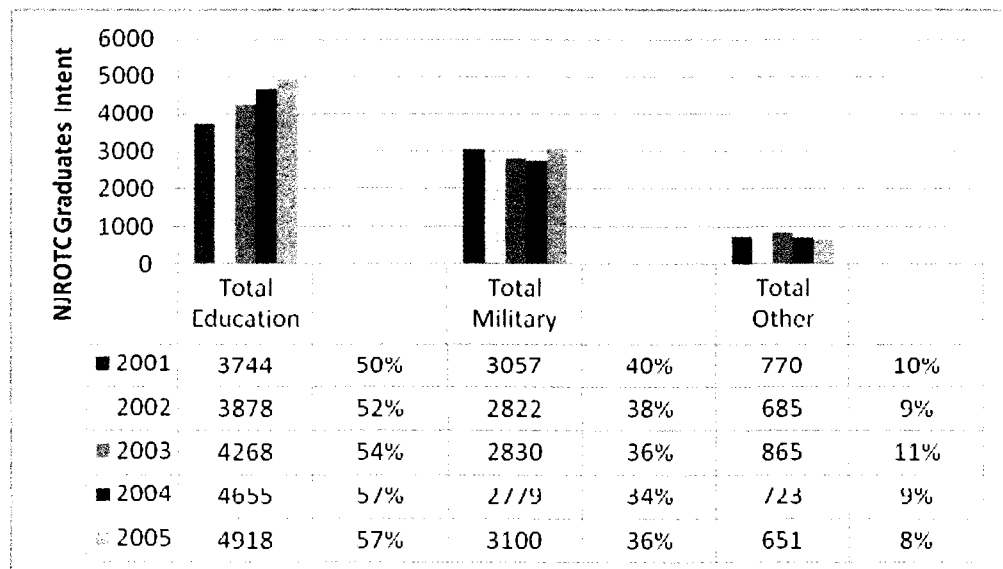


Figure 3: Number and percentage of NJROTC graduates intent to pursue education, military or other 2001 – 2005

Figure 4 shows the number and percentage of military service branch intentions for NJROTC graduating cadets for the years 2001 through 2005. Approximately 36-41 percent of the NJROTC graduating cadets intended to join the Navy. What is also interesting is that from 2001 and 2005 between 28-34 percent of the NJROTC cadets intended to join the Army and over 20 percent intended on joining the Marine Corps. The Navy is definitely losing potential recruits to the Army and Marine Corps who are on record for targeting some of their recruiting efforts at JROTC units (Department of the Army, 1999; Dr. William McHenry, personal communication, June 20, 2005).

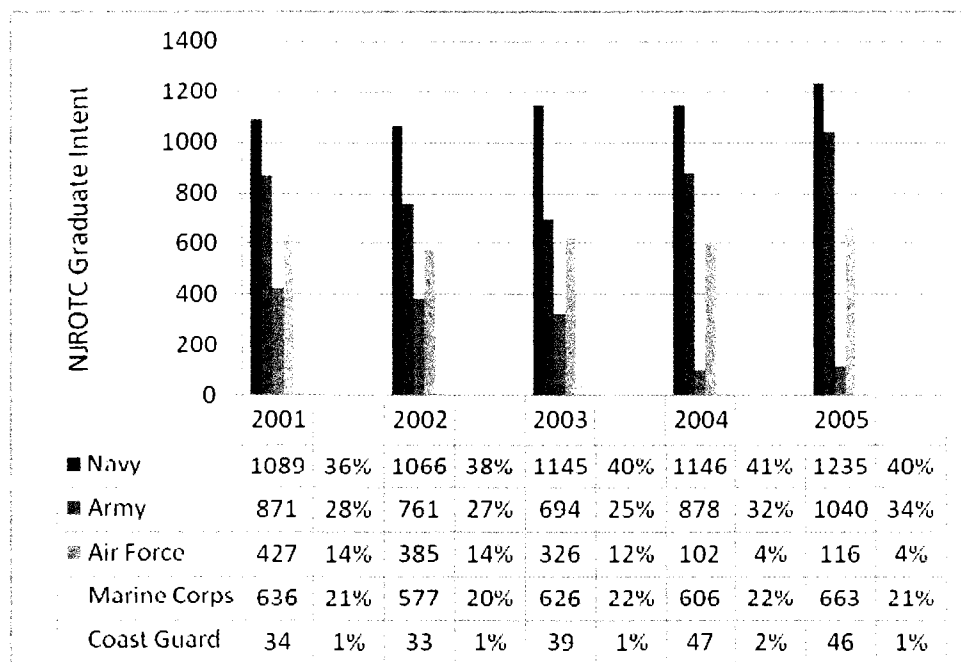


Figure 4: Number and percentage of NJROTC graduates' military service branch career intentions 2001 – 2005

Figure 5 depicts the number and percentage of the military program intentions for NJROTC graduating cadets for the years 2001 through 2005. From 2001 to 2005, of the NJROTC graduates who intended to pursue a military career, approximately 80 percent intended to be enlisted personnel, while the resultant 20 percent intended to pursue officer programs: the Academy, Boost, ROTC scholarship, and ROTC non-scholarship. The greater percentage pursuing enlisted careers suggests that NJROTC is not an officer training program but instead an enlisted training program.

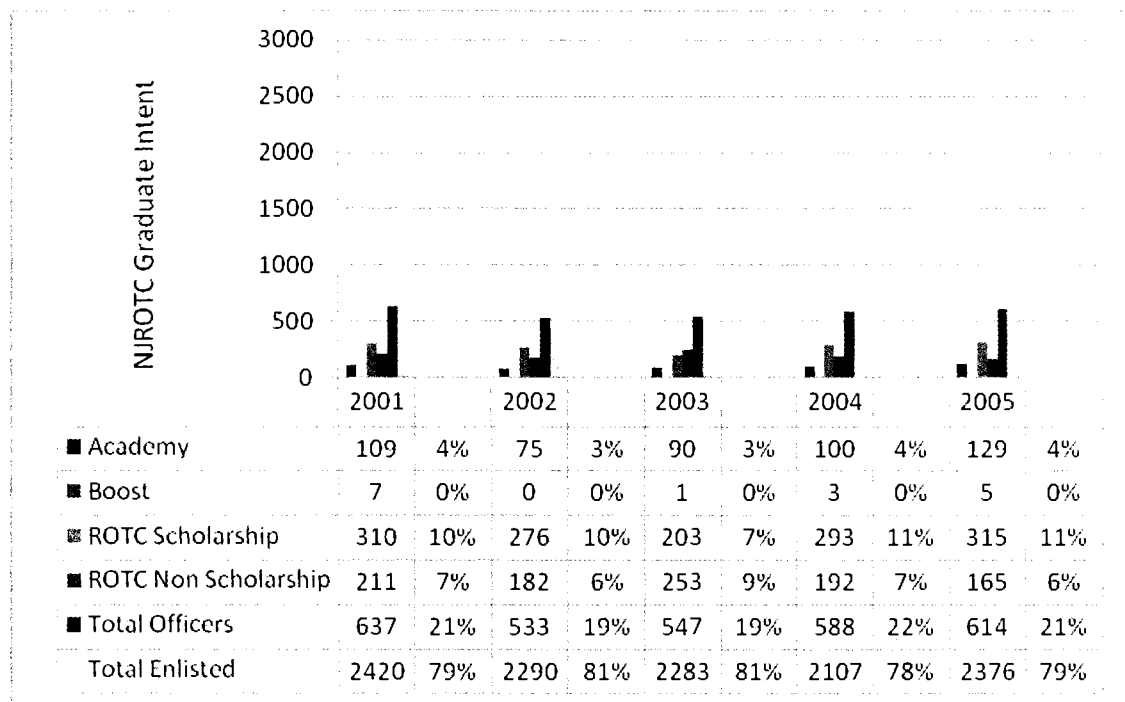


Figure 5: Number and percentage of NJROTC graduates' military program career intentions 2001 – 2005

Figure 6 summarizes the number and percentage of the graduating senior cadets' intention to pursue employment (work full time) or undecided (did not know). As presented here above, from 2001 to 2005 there has been no significant change in the percentage of cadets that intended to seek employment only, approximately 6-8 percent, or that are undecided and other in their career intent, 5-7 percent.

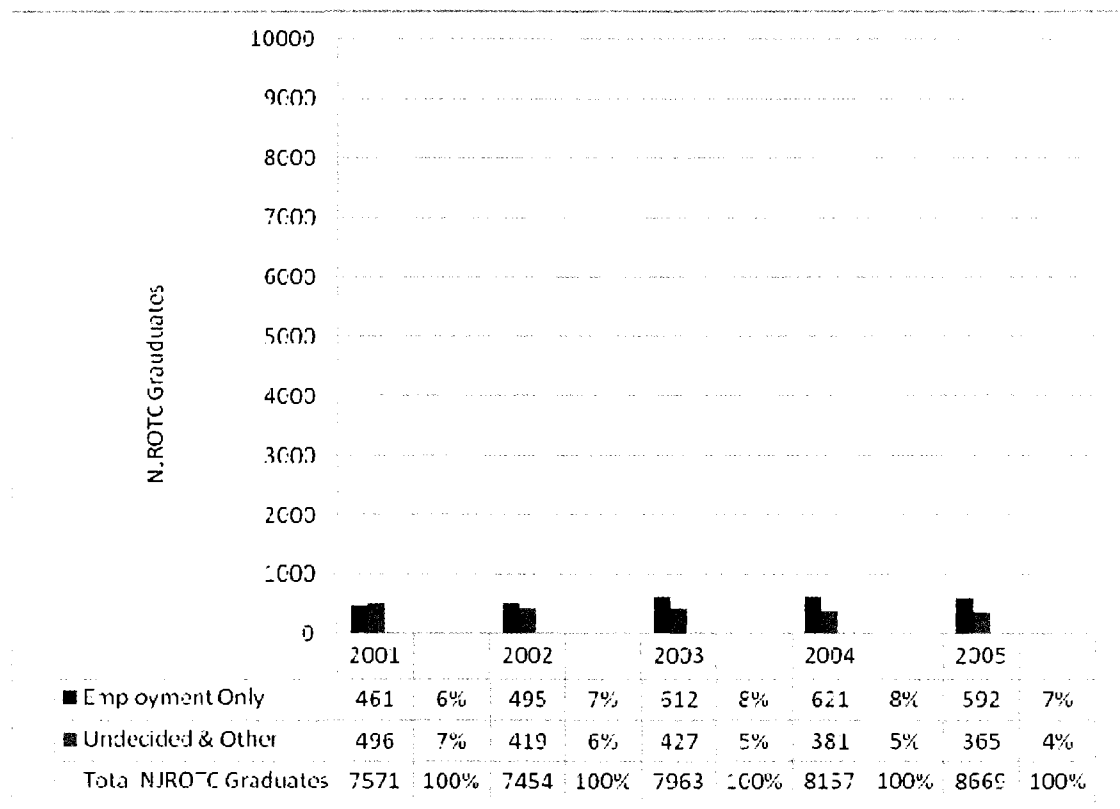


Figure 6: Number and percentage of NJROTC graduates reporting employment or undecided as career intentions 2001 – 2005

Figure 7 illustrates the number and percentage of NJROTC graduating cadets by race for the years 2001 through 2005. White NJROTC cadets make up the largest percentage of NJROTC graduates. The percentage of White NJROTC graduates did not change appreciably from 2001 to 2005, and included approximately 52 percent of the graduating cadets. Over the same period, Blacks have decreased from 26 to 22 percent with Hispanics increasing from 14 to 18 percent. The percentage of Asian and Other minorities remained stable over the same time period. Figure 7 shows that NJROTC graduated a higher percentage of Blacks and Hispanics than the representative U.S. population average of 13 percent for each, with NJROTC graduating Black cadets (22 to 26 percent) and Hispanic cadets (14 to 18 percent). NJROTC graduates are also above the Navy enlisted strength percentage with DMDC reporting in 2004 that Blacks were at 20 percent and Hispanics were at nine percent. For officers DMDC reported even less representation with Black and Hispanic officer strength at nine and five percent respectively. These percentages show that NJROTC units would be an obvious minority recruiting source to meet the Navy's goal of having a force structure that reflects the diversity of the American workforce.

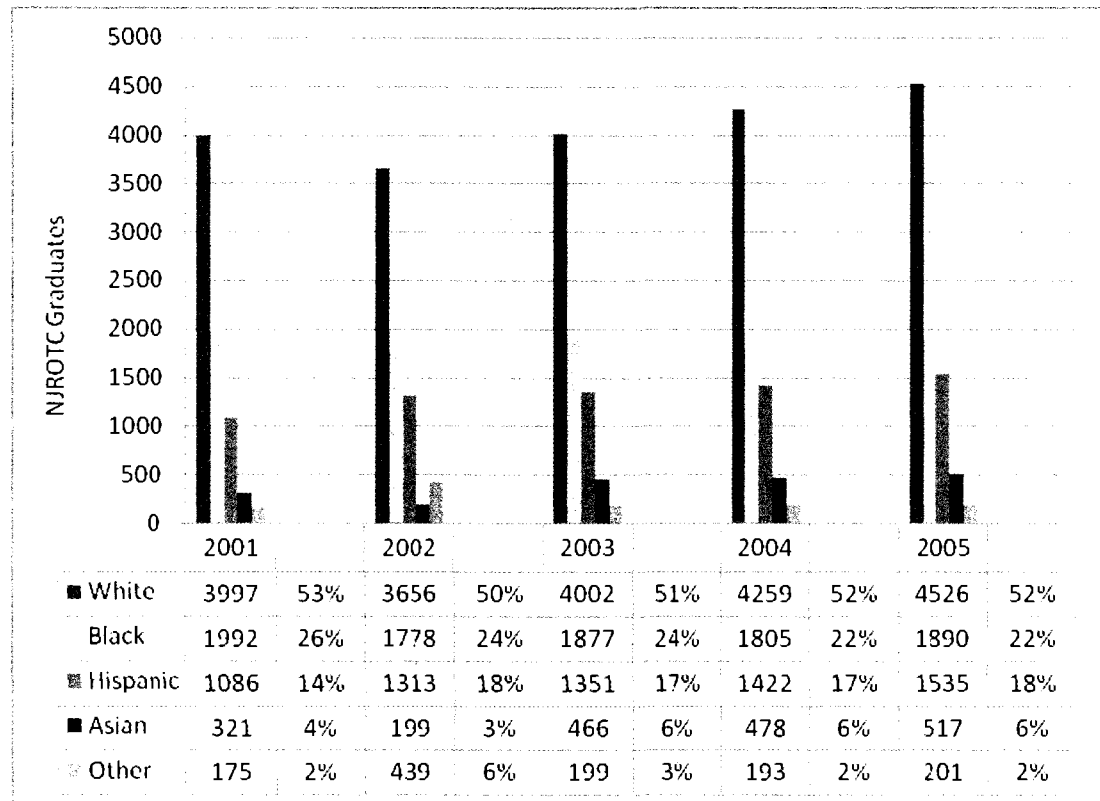


Figure 7: Number and percentage of NJROTC graduates' race 2001 – 2005

Figure 8 provides the number and percentage of the gender for NJROTC graduating cadets for the years 2001 through 2005. From 2001 to 2005, approximately 60 percent of the NJROTC graduates were males and 40 percent were females. As of 2007, females made up 14 percent of the Navy enlisted force. NJROTC could provide the Navy an obvious recruiting tool for females. The information provided in Figures 7 and 8 is summarized in Table 6, which displays the number and percentage of gender and racial data for NJROTC graduating cadets for the years 2001 through 2005.

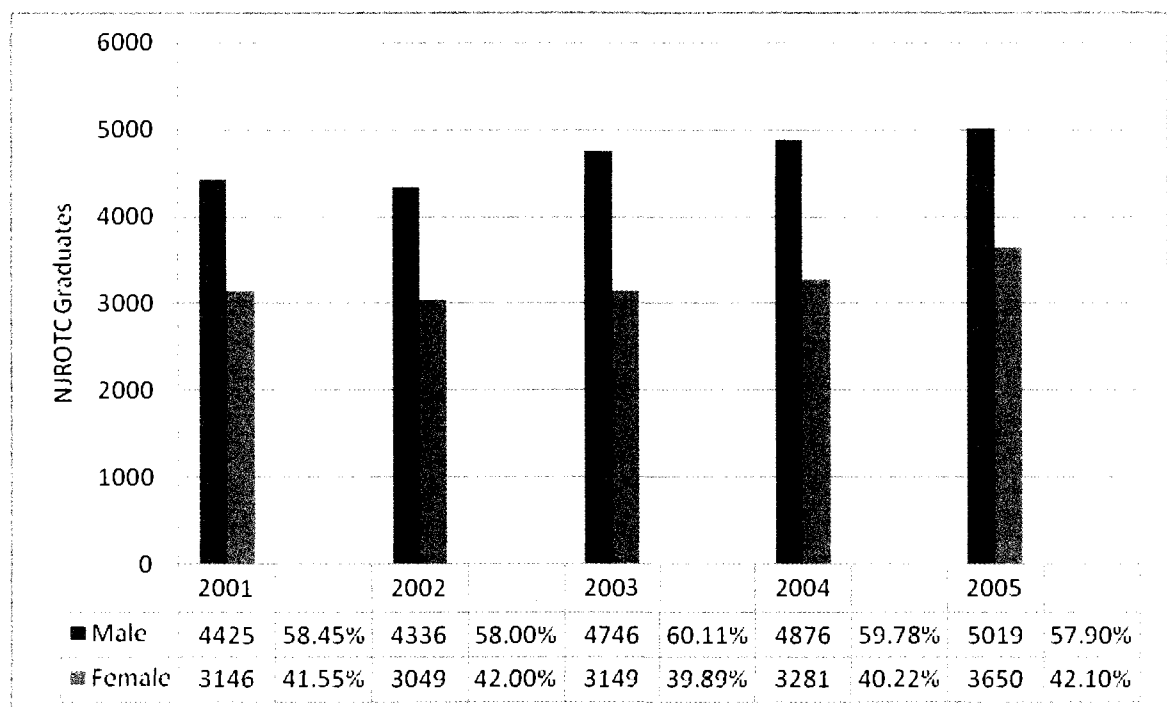


Figure 8: Number and percentage of NJROTC graduates' gender 2001 - 2005

Table 6

NJROTC Graduates Gender: Race: (2001 - 2005) - Crosstabulation

		2001			2002			2003			2004			2005		
		Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
Race	White	1358 34%	2639 66%	3997 100%	1246 34.1%	2410 65.9%	3656 100%	1258 31.4%	2744 68.6%	4002 100%	1385 32.5%	2874 67.5%	4259 100%	1540 34%	2986 66%	4526 100%
	Black	1114 55.9%	878 44.1%	1992 100%	381 21.4%	1397 78.6%	1778 100%	1042 55.5%	835 44.5%	1877 100%	995 55.1%	810 44.9%	1805 100%	1078 57%	812 43%	1890 100%
	Hispanic	479 44.1%	607 55.9%	1086 100%	858 65.3%	455 34.7%	1313 100%	599 44.3%	752 55.7%	1351 100%	662 46.6%	760 53.4%	1422 100%	724 47.2%	811 52.8%	1535 100%
	Asian	110 34%	211 66%	321 100%	159 80%	40 20%	199 100%	161 34.5%	305 65.5%	466 100%	163 34.1%	315 65.9%	478 100%	215 41.6%	302 58.4%	517 100%
	Other	85 48.6%	90 51.4%	175 100%	405 92.3%	34 7.74%	439 100%	123 46.1%	144 53.9%	267 100%	76 39.4%	117 60.6%	193 100%	93 46.3%	108 53.7%	201 100%
Total		3146 41.6%	4425 58.4%	7571 100%	3049 41.3%	4336 58.7%	7385 100%	3183 40%	4780 60%	7963 100%	3281 40.2%	4876 59.8%	8157 100%	3650 42.1%	5019 57.9%	8669 100%

Note. Distribution of NJROTC Graduates Intentions, 2001- 2005. From JROTC Unit Management System Database, by U.S. Department of the Navy, 2006.

As shown, there were minimal gender fluctuations for the years 2001 and 2003-2005 with Black females making up the largest percentage of Black graduating cadets. The range is 55 to 57 percent. White females ranged between 32 to 34 percent, Hispanic females between 44 to 47 percent, Asian females between 34 and 41 percent, and Other minority females 46 to 48 percent. However, in 2002 there were major gender fluctuations, 25-30 percent, with Blacks, Asians, Hispanics and Others. Again, this increase in minority gender representation over the actual population or even the percentage of females in the Navy (14%) make NJROTC an ideal female minority recruiting source.

Table 7 reveals the number and percentage of NJROTC graduating cadets by gender and education intention for the years 2001 through 2005. As seen here in Table 7, from 2001 to 2005, females ranged from 32 to 41 percent not pursuing post-secondary education with males ranging from 47 to 67 percent. The intent to pursue four-year colleges had a decreasing trend for females from 2001 to 2003 with a high of 52 percent and a low of 27 percent of the NJROTC graduates with males having had an increasing trend of 47 to 67 percent. For gender comparisons between 2001 and 2005, junior college intent and technical or vocational intent has had fluctuations, up and down of 10 percent.

Table 7

NJROTC Graduates Gender: Post Secondary Education Intentions (2001 - 2005) - Crosstabulation

	2001			2002			2003			2004			2005		
	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
4 Year College	1139	1035	2174	1013	1380	2393	1027	2668	3695	1034	2468	3502	1133	2618	3751
	52%	48%	100%	42%	58%	100%	28%	72%	100%	30%	71%	100%	30%	70%	100%
Junior College	647	581	1228	509	666	1175	1387	1323	2710	1421	1498	2919	1653	1511	3164
	53%	47%	100%	43%	57%	100%	51%	49%	100%	49%	51%	100%	52%	48%	100%
Technical or Vocational	123	219	342	142	170	312	644	613	1257	697	685	1382	703	642	1345
	36%	64%	100%	45.5%	54.5%	100%	51.2%	48.8%	100%	50.4%	49.6%	100%	52.3%	47.7%	100%
Other	1237	2590	3827	1385	2120	3505	125	176	301	129	225	354	161	248	409
	32.3%	67.7%	100%	39.5%	60.5%	100%	41.5%	58.5%	100%	36.5%	63.5%	100%	39.4%	60.6%	100%
Total	3146	4425	7571	3049	4336	7385	3183	4780	7963	3281	4876	8157	3650	5019	8669
	41.6%	58.4%	100%	41.3%	58.7%	100%	40%	60%	100%	40.2%	59.8%	100%	42.1%	57.9%	100%

Note. Distribution of NJROTC Graduates Intentions, 2001- 2005. From JROTC Unit Management System Database, by U.S. Department of the Navy, 2006.

Table 8 shows the number and percentage of the Geographic Area from which the NJROTC graduating cadets unit are located for the years 2001 through 2005. The locations of these areas were described in Figure 1 on page 18 of this dissertation. As seen in Table 8, the 11 NJROTC geographic areas had relatively the same percentage of NJROTC graduating cadets averaging from seven to 10 percent of the total.

Analysis in each area by race and gender should be of interest to NJROTC Area Managers but was beyond the scope of this research.

Table 8

NJROTC Graduates: NJROTC Geographic Area (2001 - 2005) - Crosstabulation

		2001		2002		2003		2004		2005	
Area	3	544	7.19%	582	7.88%	691	8.68%	820	10.05%	754	8.70%
	4	792	10.46%	693	9.38%	798	10.02%	722	8.85%	898	10.36%
	5	928	12.26%	642	8.69%	769	9.66%	779	9.55%	763	8.80%
	6	830	10.96%	794	10.75%	744	9.34%	822	10.08%	837	9.66%
	7	510	6.74%	798	10.81%	727	9.13%	887	10.87%	942	10.87%
	8	889	11.74%	630	8.53%	609	7.65%	559	6.85%	617	7.12%
	9	533	7.04%	614	8.31%	731	9.18%	737	9.04%	729	8.41%
	10	670	8.85%	744	10.07%	710	8.92%	722	8.85%	816	9.41%
	11	562	7.42%	601	8.14%	660	8.29%	674	8.26%	750	8.65%
	12	596	7.87%	657	8.90%	751	9.43%	709	8.69%	851	9.82%
	13	717	9.47%	630	8.53%	773	9.71%	726	8.90%	712	8.21%
Total		7571	100.00%	7385	100.00%	7963	100.00%	8157	100.00%	8669	100.00%

Note. Distribution of NJROTC Graduates Intentions, 2001- 2005. From JROTC Unit Management System Database, by U.S. Department of the Navy, 2006.

Figure 9 depicts the number and percentage of NJROTC graduates' socioeconomic status for the years 2001 through 2005. The socioeconomic status variable for an NJROTC graduate was derived from 2000 census data based on the NJROTC units' 5-digit Zip code. The four median income groups were divided into four categories as noted earlier: Low Income – 0 up to \$43,601; Medium Low Income - \$43,601 up to \$53,026; Medium High Income - \$53,026 up to \$66,082; and High Income - \$66,082 and greater. From 2001 to 2005 as displayed in Figure 9, the higher two income groups contain between 63 to 68 percent of the NJROTC graduates. One key observation from Figure 9 is that the higher two income groups had over 62 percent of the NJROTC graduates. This helps counter those who perceive that the military and specifically the Navy primarily recruits those from lower socioeconomic statuses.

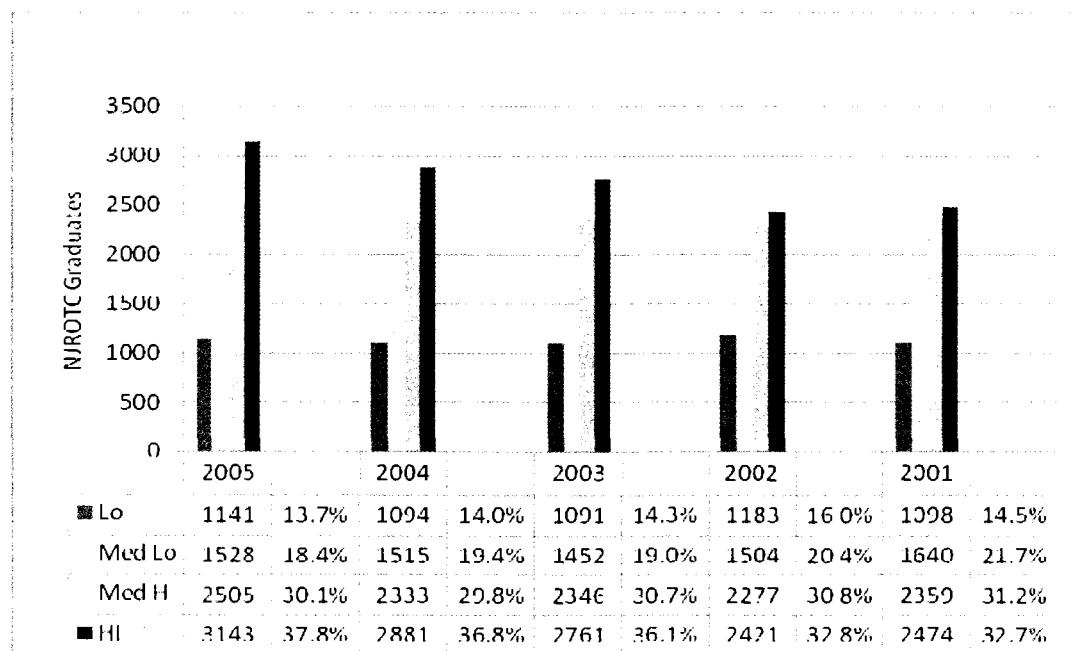


Figure 9: Number and Percentage of NJROTC Graduates by Socioeconomic Status for 2001 to 2005

Research Question 2

Are there significant differences between NJROTC participants and non-NJROTC participants for Navy enlisted accessions by race, gender, AFQT score, location, and socioeconomic status?

Data on Navy accessions were derived from the Defense Management Data Center (Appendix B). Differential analysis is offered in this section comparing NJROTC and non-NJROTC Navy accessions (Figures 10-14). Only the percent difference between NJROTC and non-NJROTC Navy accessions is offered in this section. The actual ratio of NJROTC to non-NJROTC naval accessions for 2001 to 2005 was less than one percent of all Navy accessions. Though one may have issues with forecasting descriptive statistics based on NJROTC numbers being such a small percentage of the overall Navy accessions, the data are based on the population data of Navy accessions, which does offer support for its accuracy. As stated previously, the variable socioeconomic status, which had missing data, was tested to ensure the sample mean was not statistically different from the population mean.

Figure 10 shows the percentage difference between NJROTC and non-NJROTC accessions by race for the years 2001 through 2005. Positive percentages in the figure represent the percent of NJROTC accessions for a given race category that is greater than non-NJROTC accessions, whereas negative percentages indicate the reverse. As seen here, there were eight percent more White non-NJROTC accessions in 2001 indicated by the trend line starting at minus eight percent. For Black accessions, there were eight percent more Black NJROTC accessions than non-NJROTC accessions for 2001. The difference between both White and Black Navy accessions decreased until there was a zero percent difference in 2005. For Asians and Other there was no appreciable difference between NJROTC and non-NJROTC.

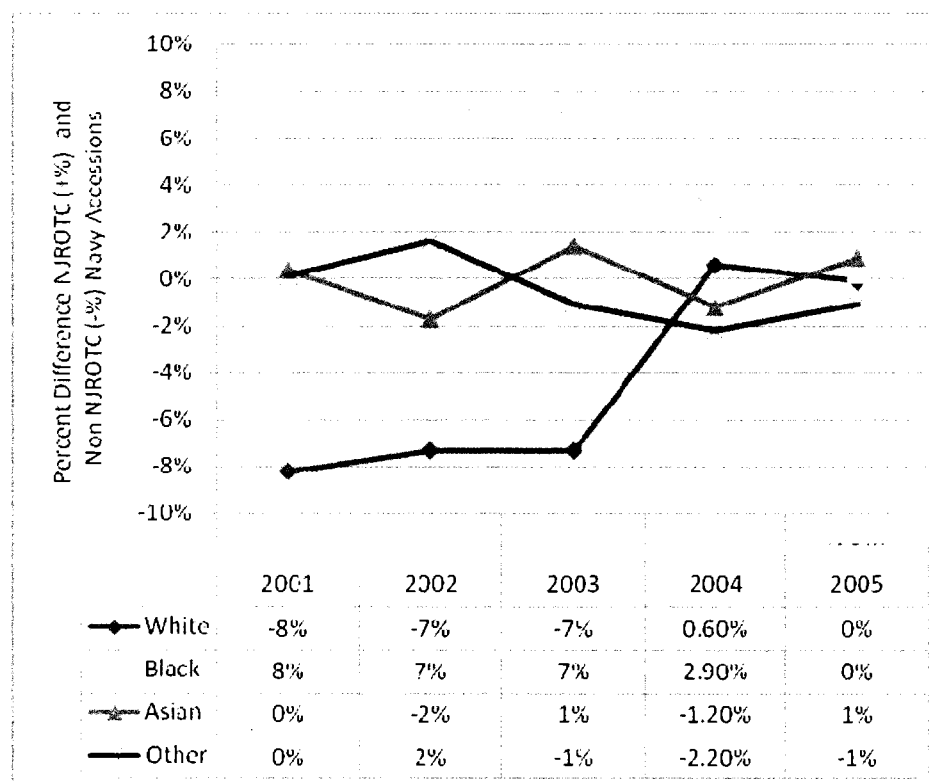


Figure 10: Percentage difference between NJROTC and non-NJROTC accessions by Race from 2001 to 2005

Figure 11 shows the percentage difference of NJROTC and non-NJROTC accessions by gender for the years 2001 through 2005. When assessing the differences over the five year period, a higher percentage of females came from NJROTC accessions than non-NJROTC accessions, one to five percent, with a correspondingly lower percentage for males. This indicates that females with NJROTC participation are slightly more likely to join the Navy than non-NJROTC accessions with the reverse holding true for males. Not displayed in this dissertation but assessed in the analysis of the data was that Black females joined the Navy at a 14 percent higher rate than non-NJROTC accessions: Whites females were 11 percent lower; Asian females were 3 percent lower; and Other females showed no difference. For males, Black NJROTC accessions were 5 percent higher, White males were 6 percent lower; Asian males were 1 percent higher, Other males showed no difference.

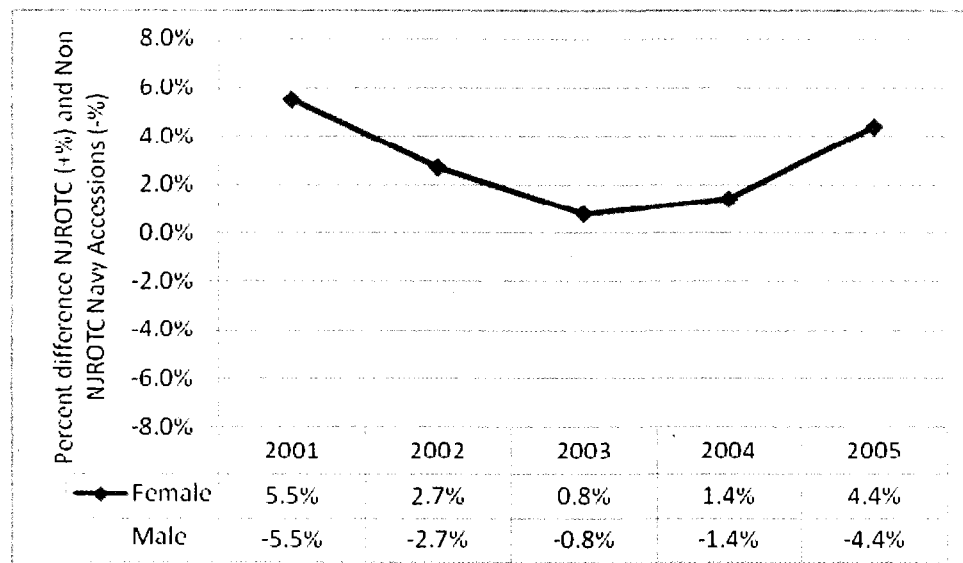


Figure 11: Percentage difference between NJROTC and non-NJROTC accessions by gender from 2001 to 2005

Figure 12 shows the percentage difference between NJROTC and non-NJROTC accessions by AFQT score for the years 2001 through 2005. AFQT score is divided into six categories with Category I being the highest AFQT test score, ranging between 93 and 99, and Category V the lowest, one to nine. Of note, the two mid-range test score categories are Category IIIA and IIIB. For the Navy, Category IIIB test scores, 31 to 49, are considered the minimum acceptable test score to be a Navy recruit. Recruits with lower test scores must generally show other qualifications to be recruited by the Navy. Fewer than one percent of the Navy accessions have Category IV or V test scores.

When assessing the differences in Figure 12, one can see that there is plus or minus three percent difference in AFQT scores when comparing NJROTC and non-NJROTC accessions. For AFQT Category I, the highest AFQT score, the percentage of NJROTC accessions is less than the percentage of non-NJROTC accessions. In Category II, the percentage of NJROTC accessions is less than the percentage of non-NJROTC accessions in all years except 2001. In Category IIIA, the first average rating for AFQT, the percentage of NJROTC accessions is the same in 2001 and greater from 2002 through 2005 than the non-NJROTC accessions. In Category IIIB, the second average category for AFQT scores, the percentage of NJROTC accessions compared to non-NJROTC accessions is greater for all years. For Category IV and V, there were few if any meaningful differences.

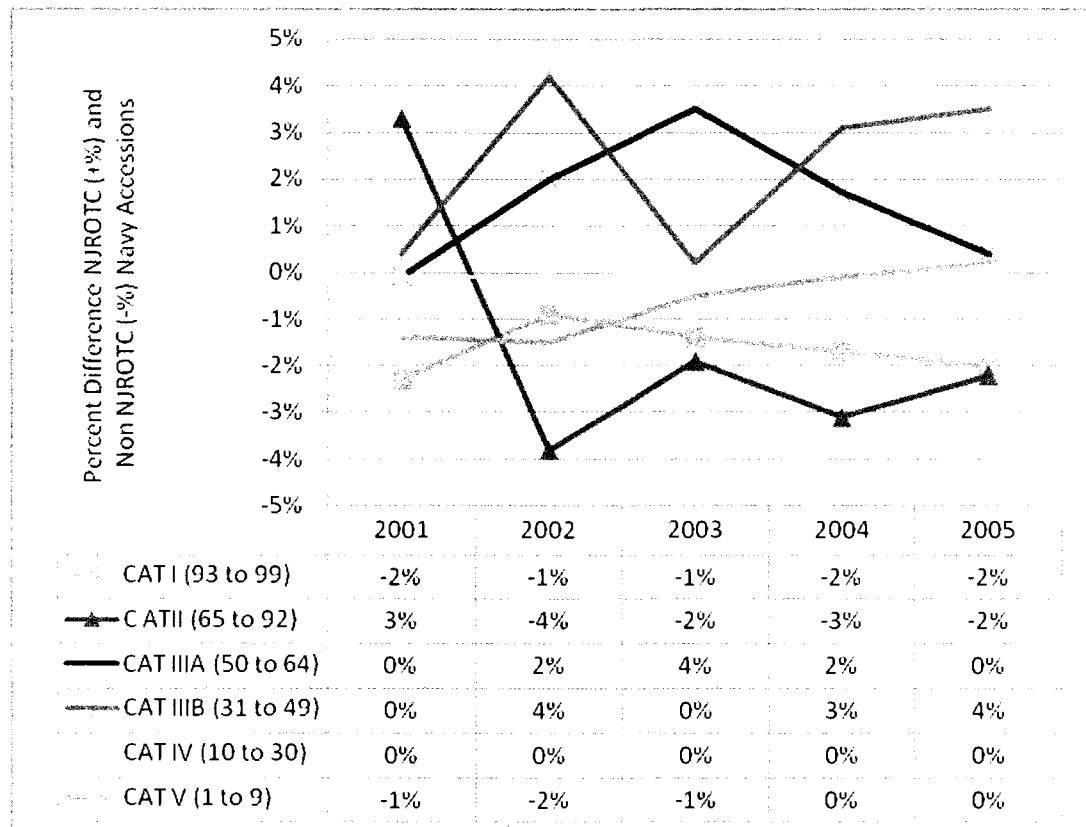


Figure 12: Percentage difference between NJROTC and non-NJROTC accessions by AFQT score from 2001 to 2005

Figure 13: Percentage difference between NJROTC and non-NJROTC accessions by U.S. region from 2001 to 2005. As shown in Figure 13, when comparing the differences of NJROTC accessions and non-NJROTC accessions by the above five regions, the most notable differences during this five-year period were in the Southeast and Midwest. At the extremes, the Southeast had approximately 27 percent greater NJROTC accession rate, while the Midwest had a 16-19 percent fewer accessions than non-NJROTC accessions. In other regions, the Northeast non-NJROTC accessions had an average of 10 percent greater accession rate over NJROTC accessions, whereas the West trend started out with a 10 percent greater accession rate in 2001 decreasing to almost zero in 2005. The Southwest had the reverse trend in comparison to the West, starting out with a 13 percent higher NJROTC accession rate decreasing to a negative two percent accession rate in 2005.

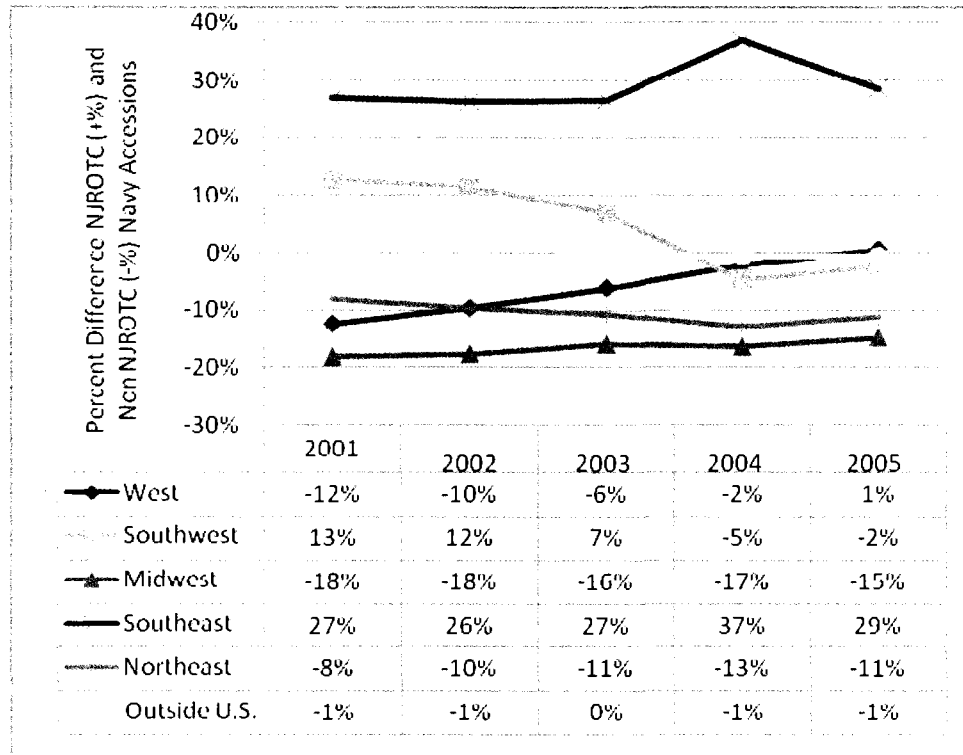


Figure 13: Percentage difference between NJROTC and non-NJROTC accessions by Region from 2001 to 2005

Figure 14: Percentage difference between NJROTC and non-NJROTC

accessions by socioeconomic status from 2001 to 2005. See the definition of key terms in Chapter 1 for the actual income categories. As seen here, the differences of percentages between NJROTC and non-NJROTC of the three lower income groups fluctuated between plus or minus seven percent over the five-year period, where as the highest income group had a greater percentage from non-NJROTC accessions at six to 13 percent. Specifically, the lowest income group, in 2001 and 2002, had a higher percentage of NJROTC accessions, about six to seven percent. This trend changed for 2003 to 2005 where difference was between one and two percent. For the second lowest income group, there was about a three to five percent increase in NJROTC accessions over non-NJROTC accessions except in 2002 where there was no difference. In the second highest income group, there was no appreciable difference from 2001 to 2002 with NJROTC accession rates three to seven percent higher than non-NJROTC accessions from 2003 to 2005. In the highest income group, NJROTC accession rates were 10 to 13 percent less than non-NJROTC accessions.

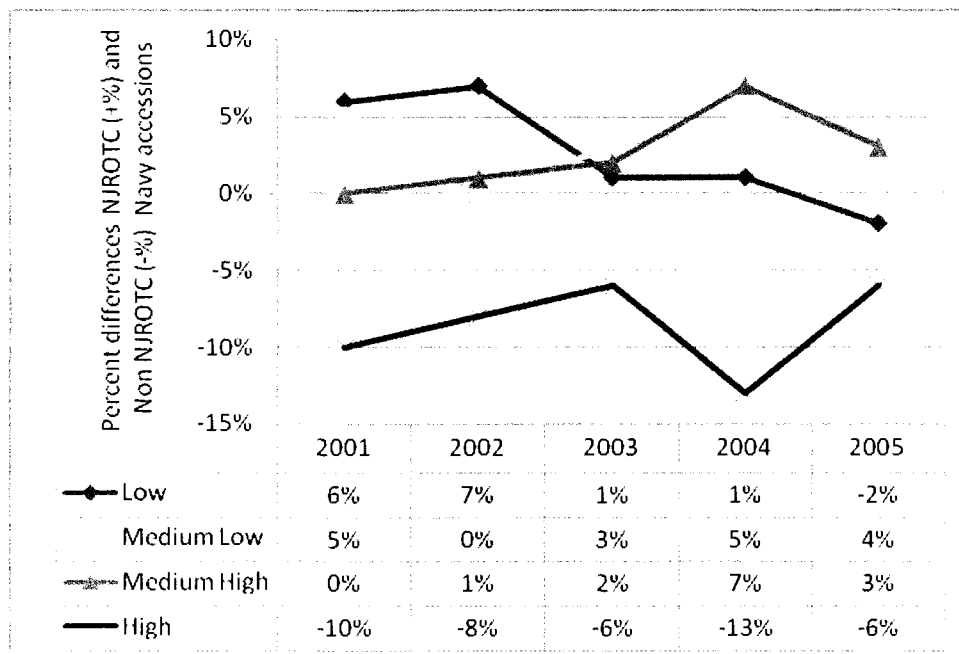


Figure 14: Percentage difference between NJROTC and non-NJROTC accessions by socioeconomic status from 2001 to 2005

Research Question 3: Are there significant differences between NJROTC participants and non-NJROTC participants for Navy enlisted retention by race, gender, AFQT score, location, and socioeconomic status?

Data on Navy accessions were derived from the Defense Management Data Center. Included in this section are descriptive data and cross tabulations which helped guide the inferential examination of NJROTC and non-NJROTC accessions with respect to retention. The second section provides the binary logistic model with a summary of the results of the model. The descriptive data provided insight into the variables that later formed the logistic regression model. Specifically, the reference category (sometimes referred as the “omitted variable”) of the predictor variables is identified for the model. The dependent variable in this analysis is the dichotomous

variable “retain,” whether or not the Navy enlisted person was retained or not within the first three years of enlistment. The dichotomous predictor variables include Gender and NJROTC participation. The categorical variables are accession year, race, AFQT score, socioeconomic status, and U.S. Region. Before the binary logistic regression model is created, it is important to highlight any interactions between the dependent variable “retain” and the predictor variables. This is accomplished in the following Descriptive Statistics section using cross-tabulation data.

Descriptive Statistics

Table 9 provides the number and percentage of Navy enlisted personnel separated from the Navy within their first three years of enlistment. As seen in the table total accessions had decreased from 2001 to 2003 with the overall percentage of Navy accessions retained increasing from 73 to 76 percent. For chronological reasons the year 2001 is the reference category (omitted variable) for this model.

Table 9

Number and percentage of Navy accessions retained or separated within the first three years of enlistment: 2001 – 2003

	2001		2002		2003		Total	
Separated	13424	26.6%	10356	23.4%	9444	23.80%	33224	24.7%
Retained	37097	73.4%	33820	76.6%	30159	76.20%	101076	75.3%
	50521	100.0%	44176	100.0%	39603	100.00%	134300	100.0%

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

Table 10 displays the number and percentage of NJROTC and non-NJROTC accessions from 2001 to 2003. Noteworthy in this table was the relatively small percentage of NJROTC accessions, fewer than one percent. Although this number is small compared to all Navy accessions, it is still significant since it is the total population of Navy accessions that reported participating in NJROTC under the DMDC Youth Program Code. Non-NJROTC Navy accessions served as the reference category for this variable in the model.

Table 10

Number and percentage of NJROTC and non NJROTC Navy accessions: 2001-2003

	2001		2002		2003		Total	
NJROTC	365	0.7%	350	0.8%	306	0.8%	1021	0.8%
Non NJROTC	50156	99.3%	43826	99.2%	39297	99.2%	133279	99.2%
Total	50521	100.0%	44176	100.0%	39603	100.0%	134300	100.0%

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

Table 11 shows the number and percentage of NJROTC graduates and non-NJROTC accessions that were retained and separated from the Navy within three years of enlistment date of Fiscal Year 2001-2003. As described in the table, NJROTC Navy accessions between 2001 and 2003 retained at a five percent greater rate than non-NJROTC accessions. As stated previously, non-NJROTC accessions served as the reference category in the model.

Table 11

*Number and percentage of Navy Accessions by NJROTC
or non NJROTC separated or retained from 2001 to 2003*

	Separated	Retained	Total
NJROTC	196	825	1021
	19.2%	80.8%	100.0%
Non NJROTC	33028	100251	133279
	24.8%	75.2%	100.0%
Total	33224	101076	134300
	24.7%	75.3%	100.0%

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

Table 12 shows the number and percentage of Navy accessions by gender who were separated from or retained in the Navy within three years of enlistment date of Fiscal Year 2001-2003. In Table 12, Males were retained in the Navy at approximately two percent greater rates than female accessions. Further, from 2001 to 2003, the Navy retained 84,096 males verses 16,980 females. Thus, males served as the reference category for the model.

Table 12

*Number and percentage of Navy Accessions
by gender separated or retained from 2001 to 2003*

	Separated	Retained	Total
Male	27164 24.4%	84096 75.6%	111260 100.0
Female	6060 26.3%	16980 73.7%	23040 100.0%
Total	33224 24.7%	101076 75.3%	134300 100.0%

Note. Distribution of naval accessions for 2001- 2003. From
Defense Management Data Center Database,
by U.S. Department of Defense, 2006.

Table 13 shows the number and percentage of Navy accessions by race who were separated from or retained in the Navy within three years of enlistment date of Fiscal Year 2001-2003. There was no appreciable difference between White and Black Navy accessions with both having a 77 percent retention rate; Asians retained at an 85 percent rate with Other races retained at 64 percent. Since Whites make up the largest number of Navy accessions retained, White Navy accessions served as the reference category for the model.

Table 13

*Number and percentage of Navy Accessions
by race separated or retained from 2001 to 2003*

	Separated	Retained	Total
White	17977 22.8%	60968 77.2%	78945 100.0%
Black	5826 22.9%	19631 77.1%	25457 100.0%
Asian	843 14.2%	5077 85.8%	5920 100.0%
Other	8578 35.8%	15400 64.2%	23978 100.0%
Total	33224 24.7%	101076 75.3%	134300 100.0%

Note. Distribution of naval accessions for 2001- 2003.
From Defense Management Data Center Database,
by U.S. Department of Defense, 2006.

Table 14 summarizes the number and percentage of Navy accessions by AFQT score who were separated from the Navy within three years of enlistment date of Fiscal Year 2001-2003. There were minimal differences with respect to retention between Category II, IIIA, IIIB and IV with accessions for all falling between 73 and 78 percent retained. AFQT Category I had the greatest percentage retained over the three years of those that reported their scores with an 82 percent retention rate. The Unknown category, which represented those accessions who did not have a reported score, had the greatest retention rate with over 90.8 percent retention rate. Category IIIB had the greatest number of Navy accessions having 46,691 out of 134,300 and as such, served as the reference category for the model.

Table 14

Number and percentage of Navy accessions' Armed Forces Qualification Test score and Separated or Retained Crosstabulation: 2001 - 2003

		Separated	Retained	Total
AFQT I	93 to 99	1127	5184	6311
		17.9%	82.1%	100.0%
AFQT II	65 to 92	9824	34188	44012
		22.3%	77.7%	100.0%
AFQT IIIA	50 to 64	9627	25700	35327
		27.3%	72.7%	100.0%
AFQT IIIB	31 to 49	12458	34233	46691
		26.7%	73.3%	100.0%
AFQT IV	10 to 30	13	48	61
		21.3%	78.7%	100.0%
Unknown		175	1723	1898
		9.2%	90.8%	100.0%
Total		33224	101076	134300
		24.7%	7.3%	100.0%

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

Table 15 gives the percentage of Navy accessions by U.S. Region that were retained or separated from the Navy within three years of enlistment of Fiscal Year 2001-2003. In this table, there was little difference with respect to geographic location and Navy retention with all regions retaining between 73 and 78 percent. The No Zip category included accessions who either did not report their home of record or joined the Navy outside the United States. Since the Southeast had the greatest numbers of Navy accessions, 36,434 out of 134,300, it served as the reference category for the model.

Table 15

*Number and percentage of Navy accessions from 5 US REGIONS
and Separated or Retained Crosstabulation: 2001 - 2003*

		Separated	Retained	Total
5 US REGIONS	West	6380	23359	29739
		21.5%	78.5%	100.0%
	South West	5099	14800	19899
		25.6%	74.4%	100.0%
	Mid West	6913	19366	26279
		26.3%	73.7%	100.0%
	South East	9519	26915	36434
		26.1%	73.9%	100.0%
	North East	5132	15723	20855
		24.6%	75.4%	100.0%
	No Zip	181	913	1094
		16.5%	83.5%	100.0%
	Total	33224	101076	134300
		24.7%	75.3%	100.0%

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

Table 16 presents the number and percentage of Navy accessions by socioeconomic status who were retained or separated from the Navy within three years of enlistment of Fiscal Year 2001-2003. Since there were missing data (less than 1.7 percent of the data), the variables for both the sample and population were means tested. The results of the means test showed that there was no difference between the population and sample databases for the variables being analyzed (See appendix C). There is no meaningful difference based on socioeconomic status for Navy accessions with all four income categories having an about a 75 percent retention rate. The High income group is the reference category for the model having the greatest number of Navy accessions with 44,735 out of 132,061.

Table 16

*Number and percentage of Navy accessions socioeconomic status
and Separated or Retained Crosstabulation: 2001 - 2003*

		Separated	Retained	Total
<hr/>				
MEDIAN INCOME				
GROUP	Low	5424	16142	21566
		25.2%	74.8%	100.0%
	Medium Low	7003	20890	27893
		25.1%	74.9%	100.0%
	Medium High	9312	28555	37867
		24.6%	75.4%	100.0%
	High	10960	33775	44735
		24.8%	75.2%	100.0%
	Total	32699	99362	132061
		24.8%	75.2%	100.0%

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

Reviewing the relevant descriptive statistics, the most likely Navy accession was a non-NJROTC White male in the High socioeconomic group from the Southeast with an AFQT category score of 3B. Based upon these data, these characteristics were the reference categories that made up the binary logistic regression model.

Binary Logistic Regression Model

The independent variable Separation Program Designation (SPD) was regrouped into a dichotomous variable with categories of Retained or Separated before completing three years of active service. Three years of service is considered the minimum time of enlistment. Even though some accessions were separated from the Navy for non-adverse reasons, they were still grouped with the accessions that did not meet the minimum contract of three years. The criterion variable for this research is dichotomous (retained in the Navy within three years of enlistment or not). Binary logistic regression analysis was used to model a Navy accession's retention prior to completing his or her first term of enlistment. The two dichotomous predictor variables used for this research are NJROTC participation and gender. The predictor variables that are categorical are race, AFQT scores, socioeconomic status, and region. The full list of variables included in the model along with a description of each variable is provided in Table 17.

Table 17

Specification of Variables in Final Model

Variable	Description and Coding
Dependent Variable	
RETAIN	0 if the Navy accession was separated , 1 if accession was retained
Dichotomous Predictor Variables	
NJROTC_REF	0 if the Navy accession was a Non NJROTC accession, 1 for NJROTC accession
Gender	0 if the Navy accession was a Male, 1 if the accession was a Female
Categorical Predictor Variable	
RACE_REF_WHITE	0 if the Navy accession's race was White - Reference Category
BLACK	1 if the Navy accession's race was Black
ASIAN	Asian
OTHER	3 if the Navy accession's race was Other
MED_INC_REF_HI	0 if the Navy accession's Medium Income group was from the Hi Income Group - Reference Category
LO INCOME	1 if the Navy accession's Medium Income group was from the Lo Income Group
MEDIUM LO INCOME	2 if the Navy accession's Medium Income group was from the Medium Lo Income Group
MEDIUM HI INCOME	3 if the Navy accession's Medium Income group was from the Medium Hi Income Group
REGION_REF_SE	0 if the Navy accession's region was from the Southeast
WEST	1 if the Navy accession's region was from the West
SOUTHWEST	2 if the Navy accession's region was from the Southwest
MIDWEST	3 if the Navy accession's region was from the Midwest
NORTHEAST	4 if the Navy accession's region was from the Northeast
NO ZIP	5 if the Navy accession's region was unknown
AFQT_REF_3B	0 if the Navy accession's AFQT category was 3B - Reference Category
AFQT CAT 1	1 if the Navy accession's AFQT category was 1
AFQT CAT 2	2 if the Navy accession's AFQT category was 2
AFQT CAT 3A	3 if the Navy accession's AFQT category was 3A
AFQT CAT 4 & 5	4 if the Navy accession's AFQT category was 4 OR 5
AFQT UNK	5 if the Navy accession's AFQT category was UNKNOWN
YEAR_REF_2001	0 if the Navy accession's year was 2001 - Reference Category
YEAR 2002	1 if the Navy accession's year was 2002
YEAR 2003	2 if the Navy accession's year was 2003

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2001 - 2003.

Model estimation was accomplished using two separate programs for binary regression models: binary logistic and probit. The probit model was not considered an optimum model based on the fact that the logit and probit model yield similar results for probabilities between .20 and .80. Further, the probit model does not offer the log odds information that is provided by the logit model. Therefore, the binary logistic, which offers several features to handle variable interaction effects, was used. Stepwise regression was also conducted in the exploratory phase for purposes of pure prediction. At the conclusion of the exploratory phase of conducting model runs, the

final model and the respective choice of variables was based on what made sense theoretically, as opposed to allowing the choice of the model based solely on a computer algorithm. This is supported by Menard who claims, “there appears to be general agreement that the use of computer-controlled stepwise procedures to select variables is inappropriate for theory testing because it capitalizes on random variations in the data and produces results that tend to be idiosyncratic and difficult to replicate in any sample other than the sample in which they were originally obtained” (p.54, 2002). Based on this theoretical model selection, an explanation of the results for the logistic regression model follows.

The first graphic displayed in the analysis was the Case Processing Summary in Table 18 that provided the number of Navy accessions being analyzed. For this study, all accessions from 2001 to 2003 were included except for 2,239 cases. It is important to take a moment to discuss these missing cases, which were maintained in the limitation section of the methods chapter. These cases were excluded based on having no socioeconomic status data. The reason for that was the socioeconomic status variable was based on the home of record Zip code the Navy accessions reported in enlistment documents. Since the number was 2,239 out of 134,300, less than 1.7 percent of the cases, it was not considered a major problem to exclude these cases from the model based on the means test that was mentioned earlier.

Table 18

Case Processing Summary

		N	Percent
Selected Cases	Included in Analysis	132061	98.3
	Missing Cases	2239	1.7
	Total	134300	100
Unselected Cases		0	0
Total		134300	100

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

Included in the binary logistic regression output are such goodness-of-fit measures as the model chi-squares, log likelihood, pseudo measures of R square using the Cox and Snell and the Nagelkerke test, and the Hosmer and Lemshow test, which are described next. Results of the logistic analysis indicated in Table 19 by the model chi-squares provides a statistically significant improvement over the constant only model, $X^2(20, N = 132,061) = 3460.53$. This clearly suggests that the independent variables improve the prediction of the outcome.

Table 19

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	3460.53	20	0
	Block	3460.53	20	0
	Model	3460.53	20	0

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

The Model Summary table, shown in Table 20, presents three measures of how well the logistic regression model fits the data. The -2 Log likelihood statistic is 144365.63. For this particular logit model, one must look at the likelihood ratio chi-square. That measure is defined as $2(L_1 - L_0)$, where L_0 represents the log likelihood for the “constant only” model, and L_1 is the log likelihood for the full model with constant and predictors. This is the probability of obtaining this chi-square statistic (144365.63) if there is in fact no effect of the independent variables, taken together, on the dependent variable. This statistic normally has little value except for comparing different logistic models. The Cox & Snell R Square (.03) and Nagelkerke (.04) are pseudo R^2 measures. These two pseudo R squared tests were used to determine the percentage of variance in the dependent variable explained by the independent variable in logistic regression and are analogous to R^2 generated in multiple regression analysis. Based on these R^2 measures, the model only explained three or four percent of the variation of Navy retention.

Table 20

Model Summary

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
144365.63	0.03	0.04

Note. Distribution of naval accessions for 2001-2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

The Hosmer and Lemeshow Test in Table 21 provided a formal test assessing whether the predicted probabilities match the observed probabilities. In this research, the goodness-of-fit statistic is 86.62, and is associated with a p value of .00, indicating a close match between the predicted and observed probabilities.

Table 21

Hosmer and Lemeshow Test

Chi-square	df	Sig.
86.62	8	0.00

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

Prediction success for the cases listed in the model was 75.2 percent. This percentage is based on the number retained, 99,362, divided by the total number of Navy accessions in the model 132,061. Based on the descriptive statistics of the predictor variables the most likely Navy accession was a non-NJROTC white male from the Southeast with an AFQT category 3B from the Medium High socioeconomic status. These along with the accession year of 2001 were the reference categories used in the model.

Taken together, the results of the various exploratory analyses yielded the final binary logistic regression model:

$$\begin{aligned} \text{Ln}((\text{Pr Retain})/1-\text{Pr}(\text{Total Accession})) = & B_0 + B_1(\text{NJROTC}) + B_2(\text{GENDER}) + B_3(\text{BLACK}) + \\ & + B_4(\text{ASIAN}) + B_5(\text{OTHER}) + B_6(\text{LO INCOME}) + B_7(\text{MED LO INCOME}) + B_8(\text{MED HI} \\ & \text{INCOME}) + B_9(\text{WEST}) + B_{10}(\text{SOUTHWEST}) + B_{11}(\text{MIDWEST}) + B_{12}(\text{NORTHEAST}) + \\ & B_{13}(\text{OTHER}) + B_{14}(\text{AFQT 1}) + B_{15}(\text{AFQT 2}) + B_{16}(\text{AFQT 3B}) + B_{17}(\text{AFQT 4}) + B_{18}(\text{AFQT} \\ & \text{UNK}) + B_{19}(\text{2002}) + B_{20}(\text{2003}) \end{aligned}$$

Table 22 displays the regression coefficients (B), the Standard Error (S.E.), the Wald statistics, significance level, odds ratio [Exp (B)], and the 95% confidence intervals (CI) for odds ratios (OR) for each of the predictors. The logistic regression coefficients reveal the amount of change in the log odds when there is a one-unit change in the predictor variable holding all other variables constant. A coefficient close to zero implies that there is no change due to that predictor variable. It is important to note that regression coefficients (B) do not tell us as much about the variable's importance for the research than the exponentiated coefficients [Exp (B)] with their respective confidence intervals. It is these odds ratios that are the center of the discussion on the extent to which the predictor variables impact the dependent variable retention. The confidence intervals are also important in that the relatively small confidence intervals for all the predictor variables suggest an acceptable level of precision in the model's predictor variables. The Wald test reports that all the predictor variables were statistically significant predictors of retaining naval accessions (except for MIDWEST, AFQT 3A and AFQT 4&5). This test is analogous to the "t" test in multiple regression.

As stated previously, the results of the Exp (B) column, the odds ratio, and their respective confidence intervals provided the most meaningful data from the model data listed in Table 22 and is the highlight of the next discussion.

Table 22

Logistic Regression Result from 2001-2003 DMDC Data

	B		S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
								Lower	Upper
NJROTC	B ₁	0.37	0.08	20.91	1	0.00	1.45	1.24	1.70
GENDER	B ₂	-0.06	0.02	13.32	1	0.00	0.94	0.91	0.97
RACE_REF_WHITE				2217.63	3	0.00			
BLACK	B ₃	0.10	0.02	26.84	1	0.00	1.10	1.06	1.14
ASIAN	B ₄	0.46	0.04	138.35	1	0.00	1.59	1.47	1.71
OTHER	B ₅	-0.69	0.02	1649.33	1	0.00	0.50	0.49	0.52
MED_INC_REF_HI				32.94	3	0.00			
LO INCOME	B ₆	0.11	0.02	30.57	1	0.00	1.12	1.08	1.17
MEDIUM LO INCOME	B ₇	0.06	0.02	11.95	1	0.00	1.07	1.03	1.10
MEDIUM HI INCOME	B ₈	0.05	0.02	9.55	1	0.00	1.05	1.02	1.09
REGION_REF_SE				512.17	5	0.00			
WEST	B ₉	0.37	0.02	347.71	1	0.00	1.45	1.39	1.51
SOUTHWEST	B ₁₀	0.20	0.02	88.08	1	0.00	1.22	1.17	1.27
MIDWEST	B ₁₁	0.01	0.02	0.11	1	0.74	1.01	0.97	1.05
NORTHEAST	B ₁₂	0.16	0.02	58.26	1	0.00	1.17	1.13	1.22
NO ZIP	B ₁₃	1.01	0.10	101.66	1	0.00	2.76	2.26	3.35
AFQT_REF_3B				656.90	5	0.00			
AFQT CAT 1	B ₁₄	0.51	0.04	202.86	1	0.00	1.66	1.55	1.78
AFQT CAT 2	B ₁₅	0.25	0.02	230.19	1	0.00	1.28	1.24	1.33
AFQT CAT 3A	B ₁₆	-0.01	0.02	0.12	1	0.73	0.99	0.96	1.03
AFQT CAT 4 & 5	B ₁₇	0.31	0.32	0.96	1	0.33	1.36	0.74	2.52
AFQT UNK	B ₁₈	1.26	0.08	242.46	1	0.00	3.52	3.00	4.12
YEAR_REF_2001				161.27	2	0.00			
YEAR 2002	B ₁₉	0.16	0.02	112.11	1	0.00	1.18	1.14	1.21
YEAR 2003	B ₂₀	0.17	0.02	118.97	1	0.00	1.19	1.15	1.23
Constant	B ₀	0.82	0.02	1407.18	1	0.00	2.28		

Note. Distribution of naval accessions for 2001- 2003. From Defense Management Data Center Database, by U.S. Department of Defense, 2006.

When assessing the odds ratio in column Exp (B), Navy accessions with NJROTC participation were 45 percent more likely to retain in the Navy for their first three years of enlistment than non-NJROTC accessions, adjusting for gender, race, region, AFQT score, socioeconomic status, and year of accession. One can also see that at the 95 percent confidence interval, the lower limit was 1.24 and the upper limit was 1.70, which equates to a 24 to 70 percent probability that NJROTC accessions

were more likely to retain than non-NJROTC accessions. Thus, the influence of NJROTC, which was the basis of this research, was found to have a positive effect on naval accessions retaining in the Navy for their first term of enlistment. The next step focuses on discussing the interaction affects of the other predictor variables.

Gender was significant when holding all other variables constant. Females had a six percent decrease in the odds of retaining when compared to males holding all other variables in the model constant.

For Race, all categories when referenced to White Navy accessions were significant. The Black Navy accession had a 10 percent increase in the odds of retaining when compared to the White Navy accession holding all other variables in the model constant. The Asian Navy accession had a 59 percent increase in the odds of retaining holding all other variables in the model constant; and the unknown Navy accession, which most likely contains large proportion of Hispanics, had a 50 percent decrease in the odds of retaining when compared to White Navy accessions holding all other variables in the model constant.

For socioeconomic status, all categories of income when referenced to the High income group were significant. The Low income group had a 12 percent increase in the odds of retaining when compared to the High income group holding all other variables in the model constant. The Low Medium income group had a six percent increase in the odds holding all other variables in the model constant; and the High Medium income group had a five percent increase in the odds holding all other variables in the model constant.

For Region, all regions when referenced to the Southeast were significant except for the Midwest with a reported significance value of .74. It is important to note that this predictor variable does not have a meaningful difference from the reference variable. This can be also seen from the reported confidence interval with the lower limit of .97 and the upper limit reported as 1.01, indicating an odds ratio close to one to one resulting in a failure to reject the null hypothesis for this particular variable. The West had a 45 percent increase in the odds of retaining when compared to the Southeast holding all other variables in the model constant. The Southwest had a 22 percent increase in the odds of retaining holding all other variables in the model constant; the Northeast had a 17 percent increase in the odds of retaining holding all other variables in the model constant; and those that did not report a Zip code had a 176 percent increase in the odds holding all other variables in the model constant.

For enlisted qualification test scores using AFQT categories compared to the reference AFQT Category 3B, all variables were significant except AFQT Category 3A and 4, with their respective significance values at .73 and .33. The AFQT Category 1 had a 66 percent increase in the odds of retaining holding all other variables in the model constant; the AFQT Category 2 had a 28 percent increase in the odds of retaining holding all other variables in the model constant; and those that had missing AFQT score had a 252 percent increase in the odds holding all other variables in the model constant.

For Accession Year, all categories of the year of Navy accessions when referenced to 2001 were significant. The accessions from 2002 had a 18 percent increase in the odd of being retained when compared to 2001 accessions holding all

other variables constant. The 2002 accessions had a 19 percent increase in the odds of being retained when compared to the 2001 Navy accessions holding all other variables constant.

Research Question 4

Is there a significant difference between NJROTC graduate cadets' intent to enlist in the Navy and their actual behavior by race, gender, and location?

The Navy JUMS database, which contains the NJROTC graduate intent data, was compared to the DMDC database containing the actual accessions data. When the actual data were compared, the results showed that over a three-year period only 40 percent of those who intended on enlisting in the Navy per the JUMS data were recorded as enlisting per the DMDC data. These low percentages prevented drawing a reasonable link between the JUMS and the DMDC database and thus conducting further analysis. Given the fact that social security numbers were unavailable from NJROTC Unit for Privacy Act reasons cited by the NETC, there was no way to track an NJROTC graduate's intentions from the JUMS database with actual DMDC accessions data.

The anomaly that the percentages were so far apart is most likely due to several reasons. First of all, the DMDC database tracks only JROTC accessions who report have three or four years of JROTC, which excludes accessions with one or two years. Secondly, some of the NJROTC who stated they intended to enlist may not have enlisted. Finally, some of the NJROTC graduates may have changed their desired branch of enlistment and enlisted in another service. Because of this disparity

in data, further analysis of these data was considered too imprecise and, as a result, this research question will not be addressed further.

CHAPTER 5

FINDINGS, POLICY IMPLICATIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

The current literature shows the positive impact of the Junior Reserve Officer Training Corps participation on the values and educational performance of participants (Hawkins, 1988, Roberts, 1991; Bailey et al, 1992; Perruse, 1997; CSIS, 1999; Logan, 2000; Hicks, 2000; Demoulin & Ritter, 2000; Bulach, 2002; Morris, 2003; Marks, 2004). However, several articles were also reviewed that argued for JROTC's removal from high school campuses based on the belief that military recruiting efforts should not be represented on high school campuses (Berlowitz, 2000; Ayers, 2006; Barbassa, 2008; Johnson, 2008). More importantly, it should be noted that most of the JROTC literature is based on small-scale survey research and anecdotal evidence, with both sides of the controversy providing little quantifiable evidence on the return on investment of the program for the U.S. military.

Limited research from the Naval Postgraduate School (NPS) using Defense Management Data Center (DMDC) accessions data does provide empirical evidence suggesting that JROTC participation has a positive impact on military accessions and retentions (Laurence & Estrada, 2003; Walls, 2003; Days & Ang, 2004; Hentz & Packwood, 2007). While NPS research provides quantifiable evidence for all of JROTC, there is a paucity of empirical evidence on Navy JROTC; however, the results of the research reported in this dissertation provide empirical evidence on the positive correlation between NJROTC participation and Navy accessions and retentions.

The purpose of this study was to conduct an empirical analysis of NJROTC graduate intent data and Navy accessions data to determine the impact NJROTC participation has on Navy accessions and retentions. As described earlier, the methodology for the study was a quantitative analysis of pre-existing data. The data received from the Navy JROTC Unit Management System (JUMS) consisted of five databases from 2001 to 2005 with NJROTC intent data on approximately 8,000 records per year. Navy enlisted accessions data that were received from DMDC also contained five databases from the fiscal years 2001 to 2005 with approximately 40,000 records in each. As mentioned in the methodology chapter, selection bias was considered and deemed not a factor considering the data analyzed were the population data of NJROTC graduates and Navy accessions.

The following research questions were addressed in this dissertation: (1) What are the NJROTC graduates' post-high school career intentions by race, gender, location, and socioeconomic status? (2) Are there significant differences between NJROTC participants and non-NJROTC participants for Navy enlisted accessions by race, gender, AFQT score, location, and socioeconomic status? (3) Are there significant differences between NJROTC participants and non-NJROTC participants for Navy enlisted retention by race, gender, AFQT score, location, and socioeconomic status? (4) Is there a significant difference between NJROTC graduate cadets' intent to enlist in the Navy and their actual behavior by race, gender, and location? An attempt at linking the JUMS and DMDC data as guided by Research Question 4, and as discussed in Chapter 4, showed that the linkage was too imprecise and deemed impractical for further analysis.

Summary of Findings

Analyzing the Navy JROTC Unit Management System (JUMS) on NJROTC graduate intent data provided the following descriptive statistics to answer Research Question 1.

From 2001 to 2005, 52 percent of more than 40,000 NJROTC graduates intended on pursuing four-year college, junior college, or technical/vocation schools. In the same period, seven percent chose full-time employment with five percent undecided or marking “other.” The remaining NJROTC graduates, 36 percent, intended on pursuing a military career as an officer or enlisted person. This high percentage of NJROTC students pursuing the military was supported by the literature, which reported JROTC students are five times more likely to join the military than non-JROTC students (Laurence & Estrada, 2003). As expected, the Navy had the greatest percentage of NJROTC cadets who intended on joining the military with 39 percent. Next, the Army had 29 percent; the Marine Corps had 21 percent; and the Air Force had the figure at 11 percent.

From 2001 to 2005, the NJROTC graduates were 52 percent White, 24 percent Black, 16 percent Hispanic, five percent Asian, and three percent Other. The percentage of NJROTC graduates for Black and Hispanics is above the U.S. population average, which is 13 percent for both groups. In addition, this is also above the U.S. Navy average of 15 percent for Blacks and nine percent for Hispanic personnel as reported in 2004 by the DMDC. These findings were also voiced by other NPS studies that cite JROTC as a good recruiting source for minority groups (Laurence & Estrada, 2003; Days & Ang, 2004). As a result, this makes NJROTC an

attractive resource for Navy recruiters who are trying to achieve the Chief of Naval Operation's goal of a Navy that represents the changing face of America (Admiral Michael Mullen, personal communication, September 22, 2005; Admiral Gary Roughhead, personal communication, March 3, 2008).

NJROTC female participants' intent to join the Navy remained stable from 2001 to 2005 at approximately 40 percent. Though 40 percent is below the female representation in the American workforce of 46 percent, it is well above the 15 percent Navy female representation, making NJROTC an appealing resource to recruit females. Noteworthy is the percentage of female Blacks and Hispanics whose intent to join the Navy from 2003 to 2005 averaged 56 and 45 percent respectively. This parallels findings in the literature by Laurence and Estrada who found similar percentages (2003).

Using the socioeconomic status variable, NJROTC graduates were found to be from higher income groups than non-NJROTC accessions. This may or may not be of significance to the Navy with respect to recruiting, but it is a data point dispelling the myth that the military, including NJROTC, recruits primarily from those at lower socioeconomic status levels (Berlowitz, 2000).

Next, using the Defense Management Data Center (DMDC) database, NJROTC participants and non-NJROTC participants were compared from 2001 to 2005 to answer Research Question 2.

When NJROTC and non-NJROTC accessions were compared by race, Black NJROTC accessions showed a seven percent increase over Black non-NJROTC accessions from 2001 to 2003, decreasing to 2.9 percent in 2004 and then to no

difference in 2005. This decreasing trend for Black accessions contradicts similar research that showed Black JROTC accessions having a five to seven percent higher accessions rate from 1990 to 2001 than their non-JROTC counterpart (Laurence & Estrada, 2003). Asians and *Other* (includes Hispanics) race categories showed similar trends with Whites showing no appreciable difference from 2001 to 2005.

The female NJROTC accessions had a slightly greater percentage than their non-NJROTC accessions counterparts. From 2001 to 2005, NJROTC female accessions had a 5.5 percent greater differential in 2005, decreasing to one percent in 2003 and then increasing to 4.4 percent in 2005. This supports previous research expressing that female JROTC accessions are more likely to join the military than non-JROTC female accessions (Laurence and Estrada, 2003). Moreover, during the same five-year period, Black female NJROTC accessions had the greatest difference with a 14 percent greater accession rate into the Navy than their non-NJROTC accession counterparts. For males, over the same period, Black NJROTC accessions showed a five percent higher accession rate than non-NJROTC accessions while White males showed the opposite. It is important to note that in 2005 the difference for both Black females and males between NJROTC and non-NJROTC accessions decreased to zero. This decrease has been highlighted in news reports based on the disapproval of the war in Iraq by Blacks (Philpott, 2007).

When assessing qualification for enlistment using Armed Force Qualification Test (AFQT) scores, the findings indicated that non-NJROTC accessions had a slightly greater percentage from the higher two AFQT scores (Category I and II), averaging about two percent greater over the five-year period. The middle two scores

(Category IIIA and B), averaged three percent greater for NJROTC accessions.

Though not a dramatic difference, it supports the Laurence and Estrada study which also reported similar results for JROTC and non-JROTC accessions. The lower two AFQT scores (Category IV and V) showed no appreciable difference.

When assessing location for the five U.S. regions, all showed a stable trend with the Southeast averaging almost 30 percent greater NJROTC Navy accessions over the five-year period studied. The Southwest showed a decreasing trend for NJROTC accessions averaging five percent greater than non-NJROTC accessions. The remaining regions had a greater percentage of non-NJROTC accessions, with Midwest averaging 17 percent greater, and the Northeast averaging 11 percent greater from 2001 to 2005. Navy accessions reporting the category *Other* showed no difference. It appears that these regional results are reported in this present study for the first time in the existing JROTC literature.

The socioeconomic status data showed NJROTC accessions had a greater percentage from the Low, Medium Low, and Medium High income groups whereas non-NJROTC accessions showed about a nine percent greater difference in the High income group. This in itself could suggest that the military is a more attractive opportunity for NJROTC accessions than non-NJROTC accessions at the lower three income groups. Since the accessions were enlisted accessions only, perhaps NJROTC graduating cadets in the higher income group pursued a career as an officer, which was not tracked by the DMDC data.

The above findings suggest rejecting the hypothesis offered in the methodology chapter - *Among Navy enlisted accessions, there is no significant*

difference between those who participated in NJROTC and those who did not.

NJROTC participation showed significant differences on Navy accessions with Black females, recruits from the Southeast, and recruits from the lower three socioeconomic status groups. Other NPS studies substantiate that there was a positive association between JROTC participation and military accessions (Laurence & Estrada, 2003; Days & Ang, 2004).

The DMDC database from fiscal year 2001 to 2003 was also used to answer Research Question 3.

For apparently the first time in the Navy JROTC literature it is believed, a logistic regression model was created using Navy retention as the dependent variable and NJROTC participation as the primary predictor variable to determine the association NJROTC has on Navy retention. Also assessed were the interactions of other variables on Navy retention. The findings support previous JROTC studies by NPS suggesting that JROTC participation has a strong positive association on military retention (Hentz, 2007; Laurence & Estrada, 2003; Days & Ang, 2004). The noteworthy finding based on the logistic regression model was that NJROTC accessions are 45 percent more likely to retain in their first term of enlistment over non-NJROTC participants after holding all the other variables in the model constant. The results from this model suggest that the hypothesis that *among Navy enlisted who are retained in the Navy, there is no significant difference between those who participated in NJROTC and non-NJROTC accessions* should be rejected.

Policy-Making Implications

This study has policy-making implications for the Navy, local school districts, and anti-JROTC organizations. These organizations will be the focus of the discussion.

Implications for Navy Policy-Making

As mentioned, a high percentage of NJROTC graduates intended on joining the Army and Marine Corps. It was also found that the Army and Marine Corps actively recruit the service JROTC units, whereas the Navy does not. The Navy continues to maintain that the NJROTC program is not a recruiting tool. In spite of this, Navy leaders in the Navy Recruiting Command and NJROTC Headquarters could replicate this research to compare the benefits of recruiting from this period of analysis, 2001 to 2005, to that of the future. At the same time, the Navy can continue to justify NJROTC accessions as only a side recruiting benefit based on the comparably small numbers of NJROTC graduating cadets, which continues to represent less than two percent of those who plan to enter the Navy as enlisted personnel or officers. Moreover, Navy leaders can also state that this unintended recruiting benefit from NJROTC could be because NJROTC cadets had preselected to join the military before NJROTC had any influence on their decision to join the Navy (Days & Ang, 2004).

Overall the policy implications of this research suggests that the Navy could justify continued funding of NJROTC based on graduating cadets intention to join the Navy, access to minorities, females, and the savings associated with retention. Yet, even with these potential benefits, one cannot deny that justifying NJROTC for its

recruiting benefits could also result in a major policy failure in that it could be the impetus that causes viable NJROTC Units to close. Thus, with this in mind, it may behoove the Navy leadership to continue to stress the citizenship-training objective over the collateral recruiting benefits. On the other hand, with 198 schools on the NJROTC waiting list and the Army and Marine Corps actively recruiting at NJROTC Units, it may be time to add recruiting JROTC students as a goal for NJROTC and the Navy Recruiting Command.

Implications for Local School District Policy-Making

While local school district leaders are generally pleased at having a JROTC unit that stresses citizenship and leadership, they continue to face criticism for having the military on high school campuses. The policy implication this research has on local school districts is that it could provide empirical evidence of the recruiting benefits for NJROTC to those who argue against JROTC on high school campuses. Evidence that suggests recruiting is more than an unintended benefit to the Navy, or to the military in general, with dwindling school budgets could tip the scales in favor of those that argue against JROTC.

Implications for Anti-JROTC Organizations Policy-Making

In the literature review, organizations that take an anti-JROTC stance were discussed. This research provides added evidence that could be used by these organizations to show there is quantifiable evidence that NJROTC units are benefiting the Navy in its recruitment efforts, unintended or not. Empirical evidence that NJROTC offers the Navy recruitment benefits coupled with existing Navy policy to provide special incentive considerations into officer entry programs and

entitlements for advanced promotion upon enlistment make it difficult to argue that NJROTC is not a recruiting program.

Recommendations for Future Research

With 198 high schools on the waiting list to have a NJROTC Unit on their campus, cost benefit analyses should be conducted by the four JROTC service programs to determine what the proper service mix should be for adding JROTC units. One important data point to be included in a cost benefit analysis to support increasing NJROTC units is the cost savings associated with not having to discharge a recruit early. The model in this research suggests that 45 percent of NJROTC Navy accessions are more likely to be retained during their first term of enlistment over their non-NJROTC counterpart. This, taken together with the direct costs to train an NJROTC cadet, \$5000, verses recruiting a non-NJROTC accession, \$11,000, could be modeled to determine whether Navy funds should be transferred from the Navy Recruiting Command to NJROTC. Previous research on all the service JROTC programs reports that the military could save almost \$42 million annually. These savings are primarily based on DOD estimates to recruit, train, and retain a military accession (Laurence & Estrada, 2003).

A warning is offered in advance for those who may pursue cost benefit analysis to support adding JROTC units as a recruiting tool. Cost benefit analysis has been criticized for being a rational decision tool that is not suited to handle complex social problems as well as providing non-normative solutions to normative social problems (Patton, 1993). If this type of analysis were to be conducted, it would be

important to conduct an added risk mitigation analysis based on recruiting being added to the JROTC mission statement.

Since this research suggests that NJROTC should be considered as a recruiting tool, a question worth asking is what would happen if the Navy changed its stance by declaring NJROTC was also to be used as a recruiting tool. Answering this question could be an ideal research project using survey instruments. The target of the survey should be a strategic sampling of principals or stakeholders at high schools with NJROTC units. In answering this question, one could forecast that certain units would close if recruiting were to be added to the mission statement. Given the likelihood that certain units may close and until further policy analysis is conducted, Navy leaders should remain status quo with their stance that NJROTC is a citizenship and leadership program. This is supported by the controversy in San Francisco where the school board voted to close all JROTC units citing unequal treatment based on the military's "Don't ask, don't tell" policy and the belief that JROTC is a military recruiting tool (Barbassa, 2008). A recent non-binding ballot measure in November, 2008 supported retaining JROTC in San Francisco, though this vote does not mean that JROTC will be retained (Johnson, 2008).

This study suggests that NJROTC participation is a good recruiting source for under-represented minorities while showing empirical evidence that there is a strong positive association with NJROTC participation and first term Navy retention. As far as implications for continuing research, this dissertation's methodology can be used annually to quantify the impact NJROTC has on accessions and retentions.

Additionally, it is recommended that research be conducted into why Black NJROTC

accessions have decreased from seven percent greater than non-NJROTC accessions to zero between 2001 to 2005. Recent reports from DMDC showed that all services had declines in Black enlistment from 2002 – 2006. Sentiments from the Black community, as mentioned earlier, indicate the reason behind the drop in Black enlistments is based on the Black communities' disapproval of the war in Iraq (Philpott, 2007).

While the NJROTC program not only teaches high school students leadership and citizenship as defined in the NJROTC mission statement, it also instructs them about life in the Navy and Marine Corps. This, anecdotally, suggests that NJROTC could be used as a pipeline-training tool in that NJROTC fulfils the role of a Navy orientation program. Further research may be warranted on the savings realized by decreasing recruit training time for NJROTC graduates.

Based on research question four of this research, 40 percent of NJROTC graduates who intended to enlist per the JUMS database actually enlisted per the DMDC database. This discrepancy was found when attempting to link NJROTC intention from the JUMS database and the actual accession data from the DMDC database. To address this discrepancy further research is warranted into why the Navy JUMS database does not match the DMDC accession data. As mentioned earlier in this dissertation this could be easily resolved if social security information was available on NJROTC graduates. However, due to Privacy Act reasons Social Security numbers were not available for this research.

The final research recommendation is to have the other services replicate this research to determine the impact their JROTC programs have on accessions and retentions.

Conclusion

The analysis of the Navy JROTC Unit Management System and Defense Management Data Center data adds quantitative evidence of NJROTC graduate intent data and Navy accessions and retentions data that do not exist in the current JROTC literature. The findings indicate that NJROTC is good recruiting source for Navy accessions and that NJROTC has positive influence on Navy retentions. It is the conclusion of this research, that since 1964, the Navy JROTC program continues to provide a worthy benefit of citizenship and leadership training to high school students while at the same time resulting in a recruitment benefit to the Navy.

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APPENDICES

APPENDIX A
NAVY JROTC UNIT MANAGEMENT SYSTEM (JUMS)
DATA

Navy JROTC Unit Management System (JUMS) Data

The JUMS database includes variables that record NJROTC graduate career intent data. NJROTC program managers (Pensacola, Florida) maintain the database. Each NJROTC Unit collects career intent data annually on graduating seniors and records them into the JUMS database. The JUMS database also provides NTSC with up-to-date information on student enrollment demographics and financial accounting of the unit expenses. The JUMs data have been recorded since 1994, but they have only been in a computer accessible database since 2000. Thus, the 6 years obtained for this study range from 2000 to 2005. The relevant data for this study on graduating career intent include the following:

1. Race (Black, White, Hispanic, Asian and Other)
2. Location of Unit (NJROTC Geographic Area)
3. Gender
4. Post High School Career Intention Variables
 - a. Enlisted by service
 - b. Officer entry programs by service
 - c. Two-year college
 - d. Four-year college
 - e. Trade/vocational
 - f. Employment
 - g. Undecided
 - h. Other

APPENDIX B
DEFENSE MANAGEMENT DATA CENTER (DMDC)

Defense Data Management Center (DMDC) Data

The DMDC is divided into five main sections: (a) Databases/Files, (b) Operational Programs, (c) Data Delivery Systems, (d) Published Reports, and (e) Historical/Files.

The data for my research were drawn from the enlisted accession's database. The population data for this study were Navy enlisted accessions divided into five cohort files between Fiscal Year 2001 and 2005. One of the key identifiers in the cohort files is "Youth Program," in which NJROTC cadets are categorized as one of the variables. Each cohort file contains 65 variables. The following variables were analyzed to determine whether there are any significant differences among NJROTC cadets, other service JROTC cadets, and non-JROTC students:

1. Social Security number (scrambled to ensure anonymity)
2. Accession date
3. Separation date
4. Separation code (reason for separation)
5. Location of enlistment (Zip code and State)
6. Race (Black, White, Asian, Other)
7. Ethnic (divided into 20 variables of interest)
8. Youth Program (JROTC, Sea Cadet, ROTC, and Cadet Air Patrol)
9. Mental Group (based on Armed Force Qualification Test (AFQT) scores).

AFQT is designed to measure the trainability of potential recruits. The categories are sub-divided into percentiles based on a potential recruit's score on the test:

CAT I: 93 to 99%; CAT II: 65 to 92%; CAT IIIA: 50 to 64%; CAT IIIB: 31 to 49%; CAT IV: 10 to 30%; and CAT V: 1 to 9%.

APPENDIX C

MEANS TESTING OF SAMPLE DATA

MEANS TESTING OF SAMPLE DATA

1. The tables below represent the means for the population and sample data for Zip codes that had missing Median Income data. The independent variable is Median Income, and the predictor variables are RACE, NJROTC, SPD SEPARATED OR NOT, GENDER, 5 US REGIONS, and AFQT NEW. Table C1 the population data and Table C2 is the sample data. The purpose of this means test is to determine whether the missing data median income data for 2,239 Navy accessions has a significant impact on the six-predictor variables that will be used in the logistic regression model for Research Question 3.

Table C1. Descriptive Statistics of the Population Mean Data (2001-2003)

Descriptive Statistics			
	Mean	Std. Deviation	N
Median Income	49966.61	68218.270	134300
RACE	1.81	1.145	134300
NJROTC	1.99	.087	134300
SPD SEPARATED OR NOT	.27	.444	134300
GENDER	.17	.377	134300
5 US REGIONS	3.02	1.414	134300
AFQTNEW	2.97	.996	134300

Table C2. Descriptive Statistics of the Sample Mean Data (2001-2003)

Descriptive Statistics			
	Mean	Std. Deviation	N
Median Income	49966.62	68794.140	132061
RACE	1.81	1.145	132061
NJROTC	1.99	.087	132061
SPD SEPARATED OR NOT	.27	.444	132061
GENDER	.17	.377	132061
5 US REGIONS	3.01	1.407	132061
AFQTNEW	2.97	.995	132061

2. The means for our six variables, RACE, NJROTC, SPD SEPARATED OR NOT, GENDER, 5 US REGIONS, and AFQT NEW between Table C1 and C2 are the same except for the 5 US REGIONS, which has a difference of .01. The means test of this variable is below, which resulted in concluding that the sample mean of this variable was not different from the population mean.

- a. Hypothesis:
 - The Null Hypothesis: The population mean is 3.01
 - The Alternate Hypothesis: The sample mean is not 3.01
- b. Level of significance is .01
- c. Test statistic Z test – the value nearest to .4950 is 2.58
- d. Decision rule – Do not reject the null hypothesis if Z falls between -2.58 and 2.58. Reject the null hypothesis if Z falls outside of -2.58 or 2.58.
- e. $z = \text{Sample Mean} - \text{Population Mean} / \text{Standard Deviation of population} / \text{the square root of the sample population}$:

$$z = -2.57001$$

- f. Because -2.57 does not fall within the rejection region (< -2.58 and > 2.58) the null hypothesis is not rejected and we can conclude that the sample mean is not different from the population mean.

Given that the other means: RACE; NJROTC; GENDER; and SPD (Separation Program Designation) SEPARATED OF NOT, and AFQTNEW are the same, one can conclude that the missing data in the Median Income variable has no significant impact on the variables used in the logistic regression model for Research Question 3.